

## Chippewa Cree Climate Adaptation Plan 2018



### *Preface*

*The phrase “climate change” can bring out different comments and opinions such as,*

*“The climate is changing, always has, and always will.”*

*“This is not new. It is nature.”*

*“People are causing the climate to change and the change will lead to destruction of life on the planet.”*

*“We need to take action.”*

*There are many questions and sources of information. It is difficult to know what to believe, when to trust, and what actions we must take.*

*A tribal elder speaks and people get quiet no matter how large the gathering. The native language is soothing and we know to listen.*

*Adapt? We’ve been adapting since day one and our resilience is legendary.*



## INTRODUCTION

The Climate Adaptation Project was a result of tribal planning at the Rocky Boy's Reservation that began with the Chippewa Cree Tribe's (CCT) Integrated Resource Management Plan 2000 and continued in the Agriculture Resource Management Plan and the Comprehensive Economic Development Strategy. The plans addressed climate adaptation, climate change, or global warming to a certain extent and included environmental protection, cultural resources protection, and sustainability. More recent terms include resilience, place based, science informed, information driven, and traditional ecological knowledge. As with other tribal plans, the planning process recruited involvement from tribal leaders, tribal managers and the reservation community. The holders of Traditional Ecological Knowledge were also called upon at the onset, throughout the planning phases, and in the latter stages of climate adaptation planning. There are previous studies and ongoing information collection that provide important details for climate adaptation. The Montana Climate Assessment 2017 released in September 2017 extended the planning in order to address new information contained in the assessment.

The Chippewa Cree Tribe submitted a grant application in 2013 to the Bureau of Indian Affairs and the project was eventually funded in 2015 by the BIA's Landscape Cooperative Climate Adaptation grant program. The project was administered by the Chippewa Cree Tribal Planning and Development Department and was the first project funded to specifically address climate change on the Rocky Boy's Reservation. The University of Montana and a subcontractor, Mr. Ronald Lodgepole (enrolled tribal member, Rocky Boy's, graduate student at Montana State University), jointly provided a climate adaptation resource kit.

Four interns completed the following phases of the project:

- Meeting with TEK holders,
- Information reconnaissance including literature review (food sovereignty, water, youth awareness, transportation),
- Interviews with the key players,
- A mini-conference,
- First Rocky Boy Climate Adaptation Conference,
- Discussions and on-campus follow-up with the University of Montana technical assistance team,
- Observation of a tribal climate change steering committee held by and for the Confederated Salish and Kootenai Tribes (CSKT) of the Flathead Indian Reservation, and
- Community review and public comment for the plan.

The CCT Planning and Development Department Director received help from the Americorp VISTA intern assigned to Rocky Boy's by Opportunity Link, Inc. The Institute for Tribal Environmental Professionals (ITEP) at Northern Arizona University, Flagstaff, AZ developed a tribal climate change/adaptation planning template that was used as a model for the project along with the Confederated Salish and Kootenai Climate Adaptation Plan. The CCT director and the VISTA intern reviewed all findings from the UofM and MSU presenters, the ITEP toolkit, the CSKT plan, and the Montana Climate Assessment. The two staff met with various other tribal staff from Tribal Water Resources, Tribal Natural Resources, Chippewa Cree Housing, Environmental Health, Stone Child College, Food Distribution, Tribal Energy, and the Chippewa Cree Tribal Business Committee. Vulnerability assessments guided the scope(s) of work and action plans.

## PURPOSE

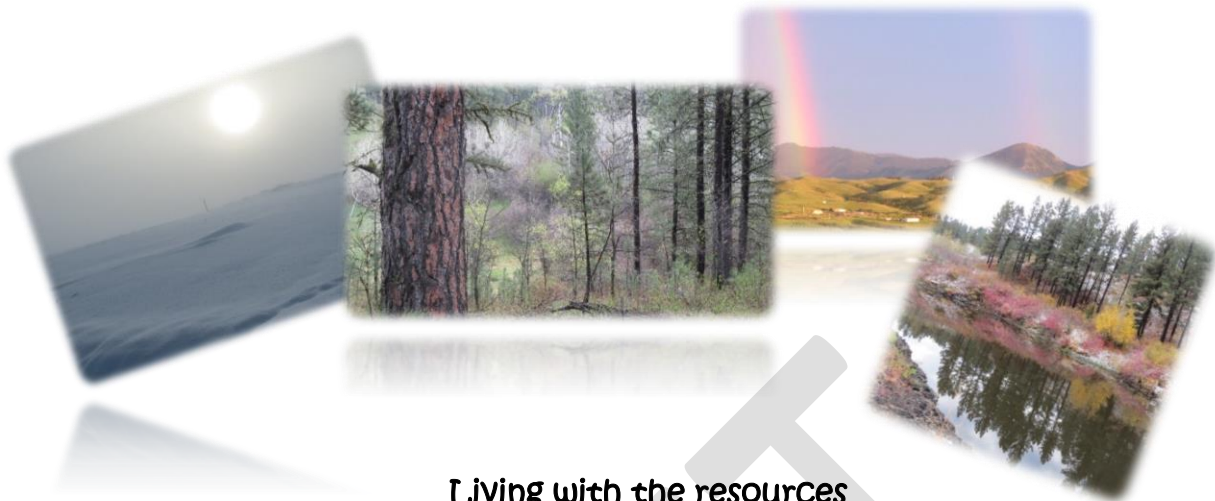
The purpose of the Chippewa Cree Climate Change Adaptation Plan 2018 is to support a timely, effective response to weather extremes based on applied knowledge, including traditional ecological knowledge, and appropriate use of technology. Our decisions and actions – individual, community, and tribal – will benefit and/or minimize any harm to our homeland and our people. The Earth is changing and the Chippewa Cree Climate Change Adaptation Plan 2018 supports a continued dialogue between the generations to foster our culture, health, and livelihood.



One important outcome from the project was a second project funded to involve summer youth interns and conferences in the community. The youth presented different parts of climate change and delivered their presentations at the conference; they were knowledgeable, poised, and prepared. They will have that experience for the rest of their lives and it may launch future leaders in the best directions for our tribe, our place, and our livelihood.







Living with the resources  
Today, tomorrow, and onward  
Through People, Prosperity, Planet  
With the goals of Peace & Partnership

Winter Spring Summer Fall



## PLANET

“Every point, every smudge is a galaxy”

-NASA portion of Hubble Extreme Deep Field

Biodiveristy: the variety and variability of life on Earth

A Part of the Universe

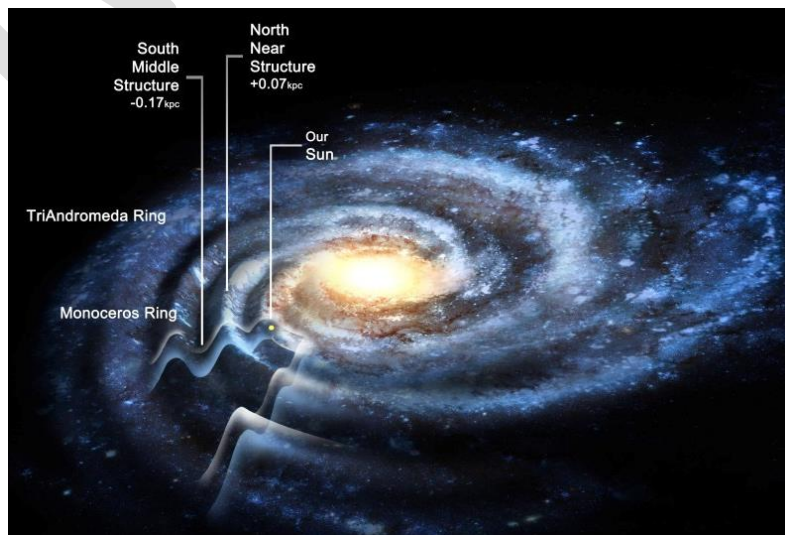
## PLACE

## PEOPLE

You are here!

“My feeling at that moment was Spiritual and lasting, one I can’t explain in words to you or even today to myself.”

-E.O. Wilson, Half-Earth





## PROSPERITY

Earth's lights at night

“...the Age of Loneliness...

is basically the age of people, our domesticated plants and animals, and our croplands  
as far as the eye can see.”

~E.O. Wilson, page 20, Half-Earth

## PEACE

“...peacebuilding and [climate change] adaptation  
are effectively the same kind of activity,  
requiring inclusive and transparent  
social engagement...”

## PARTNERSHIP

Move higher up the agenda  
Funding  
Consequences and knowledge  
Engage developers



Smith, D. and Vivenkananda, J., 2007, 'A Climate of Conflict: The Links Between Climate Change, Peace and War',  
International Alert, London <http://www.gsdr.org/document-library/a-climate-of-conflict-the-links-between-climate-change-peace-and-war/>

## SCIENCE AND POPULAR CULTURE

October 11, 1995 *Press Release*

The Royal Swedish Academy of Sciences announced the award of the 1995 Nobel Prize in Chemistry to Professors Paul Crutzen, Mario Molina, and F. Sherwood Rowland for their work in atmospheric chemistry, particularly concerning the formation and decomposition of ozone...contributed to **our salvation from a global environmental problem that could have catastrophic consequences.**

CFC's, chlorinated fluorocarbons, building blocks of aerosol sprays have the potential to deplete the ozone layer to dangerous levels. Ozone blocks harmful ultraviolet rays. The Earth's temperature will increase as ozone depletes

K.G.B. agents out to destroy capitalism.

-New York Times, March 12, 2012 explaining the discovery and fallout and accusation.

Dr. F. Sherwood Rowland said, "When you make a big discovery, you either show that everybody else was wrong, or that they missed something important. How do you think that makes them feel?"

Dr. Molina said, "We started something that was a very important precedent: people can make decisions and solve global problems.

In March 2017, the New York Times article about American thoughts on climate change shed light:

Most people think that climate change will harm Americans, but they don't think it will happen to them.

What's the use of developing a science well enough to make predictions if, in the end, all we're willing to do is stand around and wait for them to come true?

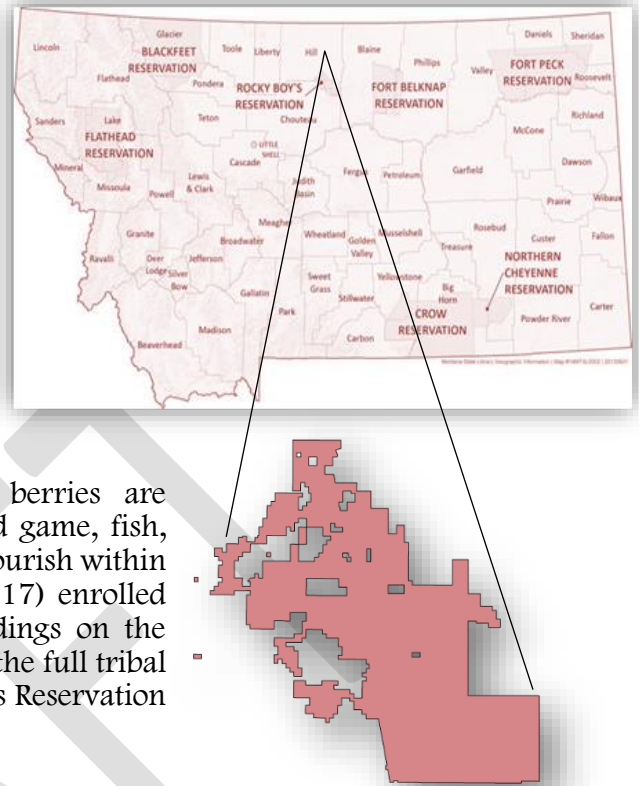
Dr. Rowland asked,



## BACKGROUND

### The Rocky Boy's Reservation

Located close to 100 miles south from the US-Canadian border, the Rocky Boy's Reservation is approximately 128,000 acres. The flatland plains roll into the foothills of the Bear's Paw Mountains – 30,000 acres set aside on the Rocky Boy's Reservation as a recreational area. There are seven water drainages on the Reservation and the water resources, surface and drinking water, are monitored for quality and quantity. Significant mineral holdings include natural gas and gravel; there are abundant lodgepole pine, Douglas fir, ponderosa pine, and aspen stands in the Bear's Paw. Willow, junberries, chokecherries, and bull berries grow throughout the Reservation. The berries are harvested for good health and strong culture. Wild game, fish, waterfowl, and game birds are sources of food and flourish within the tribal lands. Although there are 6,860 (Jan. 2017) enrolled tribal members, there are no individual land holdings on the Rocky Boy's Reservation. All land is held in trust for the full tribal membership. Today and historically, the Rocky Boy's Reservation sees the promise of a hearty agricultural harvest.



### The Chippewa Cree Tribal Business Committee

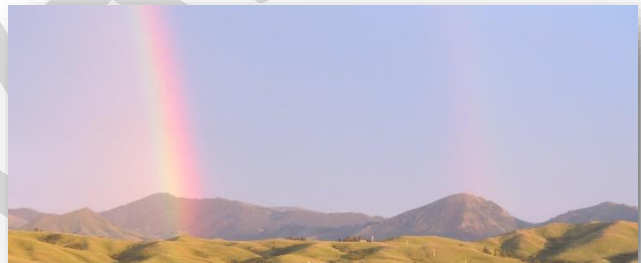
The Rocky Boy's Reservation was established by Congressional Act in 1916 as the home of Rocky Boy's Band of Chippewa and Little Bear's Band of Cree Indians. The Chippewa Cree Tribe (CCT) of the Rocky Boy's Reservation was organized in accordance with the Indian Reorganization Act of 1934 (34 Stat. P. 984) as amended by the Act of June 15, 1935 (74<sup>th</sup> Congress, Pub. No. 147). The governing document of the Chippewa Cree is the Constitution and By-Laws of the Chippewa Cree Tribe of the Rocky Boy's Reservation enacted in 1935 and amended in 1973. The Corporate Charter of the Chippewa Cree Tribe of the Rocky Boy's Reservation, Montana, ratified July 25, 1936, documents that the Chippewa Cree Tribe of the Rocky Boy's Reservation has appropriate Federal operating authority. The Tribe entered into a



BIA Self-Governance Compact Agreement with the U.S. Department of the Interior in October 1993 and thereby assumed all the functions, services, and activities that were previously administered directly by the Rocky Boy's BIA Agency. The Chippewa Cree Tribe's governing body is the Tribal Business Committee comprised of nine members who are elected at large by the tribal membership and serve alternating four-year terms. The Tribal Business Committee members serve on various sub-committees.

## The Community

The Reservation was established in 1916 with the joining of two distinct bands; Chippewa and Cree bands became the Chippewa Cree Tribe of the Rocky Boy's Reservation. There are 16 villages comprised of low rent homes in the lower elevations of the Reservation. There are also homes of various occupancy type scattered throughout the reservation in the lower 90,000 acres of foothills and flatlands. Development is forecasted for the Middle Dry Fork Area as presented in the Master Plan for flood recovery and a Preliminary Engineering Report. Stone Child College and the Rocky Boy Head Start anchor the development area which has grown to include the Chippewa Cree Justice Center, Tribal Water Resources, the Chippewa Cree Construction Company, and the Chippewa Cree Cultural Resource Protection Department. Within the year 2018, a new health center will open in the Middle Dry Fork Area and construction of the tribal office building will be underway. There are several tribally-owned businesses although private business ventures are limited due, in part, to lack of small business enterprise infrastructure (i.e., there are no buildings within which to locate private business). The cultural heritage is readily apparent at Rocky Boy's. Cree is spoken at every community event and the young people voice their longing to speak the native language. The community is strengthening the connection between the elders and youth to foster the culture, the native ways of knowing, the language, and the inherent respect for all that is created. This will guide our journey. The sale and use of illegal drugs hurts the health of the people and damages the spirit. It is destroying the ecosystem by undermining our natural relationship with Mother Earth. Clean UA, clean home and clean community lead to a clean environment and vice versa? Project W.A.R.S.H.I.E.L.D. means with aggressive resources, securing our homeland in effort to limit dugs and drug use.



Within the 2012 -2022 CCT IRMP, the Tribal Natural Resource Department staff stated, “*The world is calling us to ... make Rocky Boy a better place to live for our children and future generations. The people look towards the future and work for a better quality of life on the reservation for all the tribal members. The world is calling us to take better care of our resources, water, air, land, and our animals. A Great Chief once said, in short, “If all animals were to disappear, man would die of a great loneliness.” I truly believe in this.* As a people we need to better care for our resources and animals for our children and our children’s children. As a member of the Tribe, the world is calling us to help ensure that the reservation has a forest, range, clean water, farmland, and recreational areas for the future of our children, for generations to come, and to assist in making this happen to the best of our abilities. The world is calling us as tribal members to work together, to pull together. Put biased opinions and territorial manners aside and work together to be more caring of our community members. Embrace education to strengthen our Tribe and to support our departments. The world is calling us to keep the environment as a clean, safe place to work and enjoy. To do this we must treat our natural resources with care, use them



to their potential, and improve them as needed. We live in a high-tech world with constant change but the natural resources are not as technical as we make them out to be. We must work with technology yet keep it simple. The world is calling us to help one another out in our daily lives at work in our towns. Try to keep the Reservation, Mother Earth, clean and leave it a better place. The world is calling us to try and keep the coyote population down, to protect our deer herd, and help area ranchers so our quality of bigger bucks will come back and, in some areas, have more deer. As a member of the community, the world is calling us to represent the Tribe in what we do, to help the people, and to not judge them for who they are and what they do. We all need to be kind to each other and work together. The world is calling us not to be wasteful and to come together as a family, as families, friends, co-workers, and as a whole Chippewa Cree Tribe. Be kind to one another. It will take you more places, far and near. The world is calling us to take care of it and respect it. The earth is calling us to, “Quit torturing me!!” The earth is calling us to quit taking up our natural resources without worrying about the future and to step up and be more resourceful and think about our future and our children’s future. The earth is calling us to preserve our natural resources, protect the environment, etc., prevent water pollution, and manage our forest and livestock. To our people, we need to protect our earth for our children and grandchildren. The earth is calling us to take care of her through climate change. We as a people need to pay attention to things that are occurring. Beetle killed trees. No management in past years. Taking more than we need – we have an abundance of choices for fish, clothes, medicine, and things like that. The earth is calling us to better preserve what we have which includes water, natural resources, and air quality. We need to educate each other as to how we can better do the job in preserving as some don’t know what others know. We need to work with our leaders, our people, and our elders so that we can accomplish this goal.”



## CONTEXT

The **Intergovernmental Panel on Climate Change (IPCC)** is a scientific body that regularly reviews and assesses worldwide scientific, technical, and socioeconomic information in relation to climate change. The IPCC was established by the **United Nations Environment Programme (UNEP)** and the **World Meteorological Organization** in 1988. The IPCC Second Assessment Report of 1995 set the world stage for the **Kyoto Protocol** adopted in 1997 to address emissions reductions. At the end of 2007 the IPCC was awarded the Nobel Peace Prize, along with Albert Arnold Gore. The **U.N. Framework Convention on Climate Change (UNFCCC)** was launched at the 1992 Earth Summit in Rio de Janeiro for the “world’s leaders to adopt a series of international environmental agreements. The UNFCCC sets a long-term objective of avoiding dangerous human interference with climate system (C2ES, Center for Climate and Energy Solutions, ‘Policy Hub, International, History of UN Climate Talks’).” The UNFCCC is the key international treaty to reduce global warming. Governed by the **Conference of Parties (COP)**, which meets annually, the UNFCCC serves as “the foundation of an evolving global climate effort.” COP1 in 1995 marks the inception of the Kyoto Protocol that was adopted at COP3 in 1997 to address emissions reductions.

<https://www.c2es.org/content/history-of-un-climate-talks/>

### **A Call to Action: The Albuquerque Declaration, 1998**

<http://www.earthsummit2002.org/toolkits/women/majors/indig/ind1.html>

“The **indigenous peoples** of North America sent some 180 delegates including more than a dozen recognized tribal elders, to share ideas on the impact of climate change to the “Circles of Wisdom. Native Peoples/Native Homelands Climate Change Workshops” sponsored by NASA. Their common statement, “The Albuquerque Declaration,” was tabled at the Conference of the Parties 4 at the UNFCCC held in Buenos Aires, Argentina, November 2 – 13, 1998. **The Mystic Lake Declaration** stemmed from the Native Peoples/Native Homelands Climate Change Workshop II *Indigenous Perspectives and Solutions* at Mystic Lake on the Homelands of the Shakopee Mdewakanton Sioux Community, Prior Lake, MN on November 21, 2009, a four day event sponsored by **NASA**. “American Indian stalwarts of environmental justice met...to write a milestone climate change declaration, clearly outlining a course on how to save the planet using indigenous science and knowledge...calling for a ‘moratorium on all new exploration for oil, gas, coal and uranium as a first step towards the full phase-out of fossil fuels, without nuclear power, with a just transition to sustainable jobs, energy and environment...based on our concern over the disproportionate social, cultural, spiritual, environmental and climate impacts on indigenous peoples, who are the first and the worst affected by the disruption of intact habitats, and the least responsible for such impacts” (Rave, Jodi, “Climate Workshop Stresses Sustainability, Indigenous Knowledge).

<http://www.honorearth.org/ climate workshop stresses sustainability indigenous knowledge>

**First Stewards Symposium** addresses climate change, at the **Smithsonian’s National Museum of the American Indian** June 17-20, 2012, stated, “The symposium encouraged reaching out to policy-makers through the **National Climate Assessment** of 2013, which will for the first time include Native American input.”

**ATNI, the Affiliated Tribes of Northwest Indians**, Press Release January 26, 2018, states, “Affiliated Tribes of Northwest Indians (ATNI) and Northwest Tribes Declare Formal Support for the Paris Climate Agreement”. 8 Northwest Tribes and ATNI signed declarations to join We Are Still In, a national coalition of 2,600 leaders from across America that are committed to tackling climate change, ensuring a clean energy future, and **upholding the Paris Climate Agreement.**”

In Half-Earth, Our Planet's Fight for Life, Edward O. Wilson paraphrases the Rule of Threes used by the military and those in survival training. "You can live for three minutes without air, three hours without shelter or proper clothing in freezing cold, three days without water, and three weeks without food." The United Nations Framework Convention on Climate Change (UNFCCC) provided funds to developing countries to guide adaptation to changing biophysical resources. The plans follow a template and start with vulnerability assessments, focus on measures and designs, and implementation by coordinating/management groups. The failure or success of this approach has less to do with design principles, although they are important, and more to do with "how social-political struggles play out within them." The messenger is as important, if not more, than the message. The messenger and timing intertwine to either make the message more important or not important at all. We weren't ready to learn about the effect of chlorofluorocarbons (CFCs) on the ozone layer; it depletes the ozone thereby increasing global warming, melting the polar ice caps, contributing to coastline erosion and flooding, redistributing water resources, and temperature extremes. Science tells us this and predicts it. Are we heeding the predictions or are we waiting for the predictions to come true? Plants, animals and the rest of creation respond to the cues from nature. Some birds migrate, bears hibernate, and the coat thickens on fur-bearing creatures when the cold settles in for the season. The responses are brought about by changing conditions in the weather, food availability, instincts, and survival. We read the signs and move forward with actions that reflect the conditions.





## Traditional Ecological Knowledge

Chippewa Cree traditional ecological knowledge is,

### *THE PHILOSOPHY OF THE CHIPPEWA CREE*

We believe the Maker of All Things put us on our Mother Earth to respect one another in our relationships to all things and to all people. The Great Holy Being told the old people long ago that all people and all things are but different branches on the same tree. We are told in our daily lives we must do these things.

Respect Mother Earth and all things that live here. Respect the elders, our mothers, and our sisters.

Love one another and help one another.

Pray in a good way that we might get the power to help one another and to respect one another for our differences.

Be truthful and respectful in our speech, which in itself is a miracle and a gift from our Creator that we might use it only to speak good of each other and to pass on the good things in life.

Remember that everything that is created on Mother Earth is useful, has a purpose, and was put here for a reason. Nothing is to be abused that has been created.

Remember that all things are related and that all things are perfect as they have been created: wind, fire, water, rocks, animals, crawlers, birds, plants, the moon, the sun, and humans.

Remember that the earth was created for everyone and everything and that we are not to selfishly claim it. We are all to share the good things in life so that we may all live in harmony.

Realize that we as human beings have been put on this earth for only a short time and that we must use this time to use our minds to gain wisdom, knowledge, respect and understanding of all human beings since we are all brothers.

Be humble and respectful before the Creator every day and give thanks for putting us here on earth.

Always be respectful of life. We are not to kill our fellow man.

The elders also said, "We believe in the uniqueness of the individual and want our children to have a deep respect for others and for those things and people who may be different from them. We believe that racism and prejudice in any form is a useless exercise for the human mind because it only breeds hatred, misunderstanding, and unhappiness; it ignores the realities of the world because there are different people and beliefs which have the right to exist as long as theirs does not attempt to do away with our way of life."

and the Cree calendar.



January

## A time to be kind Moon

ԹՎԱՆԸ  
 Ki-se-pi-si-m

February

Bald Eagle Moon

ΓΡΝΛΝ<sub>c</sub>  
Mi-ko-so-pi-si-m


March

## Wild Goose Moon

σ<sup>n</sup>ρΛN<sub>c</sub>  
Ni-s-ki-pi-si-m

April

## Frog Moon


  
 Ah-ye-ki-pi-si-m

May

## Blooming Moon

np < b ° ʌ N c  
Sah-ki-pah-kah-w-pi-si-m

June

## Egg Hatching Moon

▷◁ₙb◊▽▷ΛN\_c  
O-pah-s-kah-w-wi-o-pi-si-m

July

## Shedding Feathers Moon

▷◁<sub>n</sub> dΛN<sub>c</sub>  
O-pah-s-ko-pi-si-m

August

## A Time to Fly Moon

▷◁▷ΛNc  
O-pah-o-pi-si-m


September

Faded leaves and Grass Moon

◁·nU<b°ΛNc  
Wahs-te-pah-kah-w-pi-si-m

October

## Approaching Frost Moon


  
 l-ko-pi-w-pi-si-m


November

## Frost Moon

**b<sup>n</sup>bnoΛN<sup>c</sup>**  
Kahs-kah-ti-no-pi-si-m

December

A time when snow brings  
everything to the ground


 Pah-wah-chah-ki-nah-si-s



## Traditional Ecological Knowledge – Findings from recent literature

### A series of quotes and paraphrase

“A multi-pronged approach to broadening **indigenous participation in climate-change research** should:

- 1) engage communities in designing climate-change solutions;
- 2) create an environment of mutual respect for multiple ways of knowing;
- 3) directly assist communities in achieving their adaptation goals;
- 4) promote partnerships that foster effective climate solutions from both western and indigenous perspectives; and
- 5) foster regional and international networking to share climate solutions...

Some years are harder than others...hard years are followed by times of greater abundance and celebration...**Our culture's ancestral wisdom**...modern changes not of our doing make us wonder when the good years will return...

As indigenous communities strive for sustainable adaptation in response to climate impacts, communities can learn from each other how to document observations, devise and implement adaptation solutions, and overcome barriers in funding, information exchange, and institutional hurdles.”

Page 558, 560, & 563, “Indigenous frameworks for observing and responding to climate change in Alaska”. Patricia Cochran, Orville H. Huntington, Caleb Pungowiyi, Stanley Tom, F. Stuart Chapin III, Henry P. Huntington, Nancy G. Maynard, and Sarah F. Trainor; Published online: 26 March 2013 © Springer Science+Business Media Dordrecht 2013. This article is part of a Special Issue on “Climate Change and Indigenous Peoples in the United States: Impacts, Experiences, and Actions” edited by Julie Koppel Maldonado, Rajul E. Pandya, and Benedict Colombi.

One problem a lot of **tribes** have in the **U.S.** is using western forms of government that opened up our lands for the extraction industry but are totally fragmented. This led tribal government to be categorized and divided up with health separate from environment and natural resources. **Climate change is an integrated problem.** You can't talk about climate change as “this is the natural resource aspect and that is the health aspect” because they are all integrated and bound up together. This contemporary style of government, although the federal government recognizes it as sovereign, **is not adaptable** to change while our historical governments were based on seasons, depending on the tribe, and were better.

Anthropogenic (human-caused) Climate Change involves the tribes’

- Infrastructure/financial capacity,
- Habitat,
- Cultural landscape ceremony,
- Loss of first foods storage,
- Dangerous subsistence,
- Greater human distress,
- Changes in knowledge/values, and
- Inter-generational disconnection: the very fabric of our society is disentangled and come undone and this effects language learning and our understanding of cultural norms.



**Collective continuance** is an indigenous community's capacity to be adaptive in ways sufficient for the livelihoods of its members to **flourish into the future**. We exercise knowledge sovereignty when we are figuring out what to do about climate change and hold our own knowledge as the better resource. A Knowledge Sovereignty Plan would question how our political structure works in accordance with seasons and nature.

Indigenous Environmental Justice Symposium: Kyle Whyte : <http://kylewhyte.cal.msu.edu/#intro>

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Traditional Knowledges from ATNI Tribes & First Nations Climate Summit, December 13 – 14, 2017, Tulalip WA had the purpose to understand how traditional knowledges are shaping climate change collaborations and to ensure appropriate protocols are upheld and knowledges are protected. Questions that were discussed:

- 1) How can traditional knowledge be used to appropriately advance tribal interest in resource management decisions?
  - 2) Are traditional knowledges being protected?
  - 3) Where are the gaps or needs?
- 

“The knowledge and technology required to address the issues actually already exist. It's not that anything new has to be invented to deal with climate change and other environmental challenges that are transforming the planet.”

Smithsonian Castle Lecture Series: Living in the Anthropocene, February 2014

Tim Johnson, Associate Director for Museum Programs National Museum of the American Indian; The Words that Come Before All Else: Empathic Tradition Applied in the Anthropocene

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## Thoughts

“Not until terms and concepts have been clearly defined can one hope to make any progress in examining the question clearly and simply and expect the reader to share one's views.”

(Carl Von Clausewitz, On War, Princeton University Press, 1976, p. 132) in GUIDE TO EMERGENCY MANAGEMENT AND RELATED TERMS, DEFINITIONS, CONCEPTS, ACRONYMS, ORGANIZATIONS, PROGRAMS, GUIDANCE, EXECUTIVE ORDERS & LEGISLATION, A Tutorial on Emergency Management, Broadly Defined, Past and Present, © 2007 B. Wayne Blanchard

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FEMA's definition of disaster, in monetary terms, is evolving.

Recall when we defined carrying capacity, sustained yield, Limits to Growth, peak oil, technological fix, sustainable development, intergenerational equity, sustainability, critical mass, and tipping point.

The word for the day is resilience.

Is it climate change or climate adaptation?

What is TEK in relation to science and technology, indigenous people, and Rocky Boy's?

## Review and Findings from a TEK meeting held on the Rocky Boy's Reservation, October 23, 2015

The basis for climate adaptation planning is to *prepare for stability and resilience rather than for disasters*. There is a difference. Just like the eagle looks off into the distance and can see what's coming - that's how we prepare. The holders of traditional knowledge recount living through major changes in the world such as technology, weather and climate, policy and governance, and the economy. An elder woman spoke about hauling water as a child growing into adulthood. Scanning the room, the facilitator asked for a show of hands from those participants who had hauled water during their lifetime. The youngest person in the group to have hauled water was around 55 years old and the oldest person to *not* have hauled water was 50 years old thereby inferring that the community had running water and indoor plumbing in the homes in 1965. If you have to haul water for domestic use, you don't waste the water. You don't fill a glassful and then not drink it all. The area around the water source and the containers carrying the water are clean. You are directly connected to your water source. How does technology keep us connected to the Earth? All things are changing: technology, policies, our behavior, the weather, and the climate. Each generation will go through all kinds of change. Some of the changes will take place quickly and will be intense while other changes will be so slow that they can go unnoticed. Some things won't change - **the strong and caring connection we have for each other as a distinct people living in this best place.**



## Traditional Ecological Knowledge – Resource Specific

### Fen Wetlands

A fen is a particular type of wetland area that receives the majority of its moisture from groundwater. This makes fens unique amongst other wetland types as they do not necessarily only form in areas of high precipitation. It is this unique formation that allows this particular wetland area to exist in Rocky Boy's, most of which is classified as a semi-arid climate. According to the "Report on the Meeting to Preserve and Protect the Cree Language," held on November 20, 1995 at the Duck Inn, Havre, MT "[Cultural Advisory] Commission members were taken to a **wetland**. Dorothy Small and Louise Stump pointed to a wetland and asked Bessie Denny how to say it in Cree [Note: the three elderly women have since passed]. They all agreed that there are different ways of saying it and during the reservation wetlands tour in December 1995, with more elders present, the Cree language would be covered as well." Whether the tour actually took place as planned is unknown but that doesn't mean it can't take place soon. Critical places of interest are the two fen wetlands located in Parker Canyon and near Baldy Butte, in the Beaver Creek drainage.



Both are culturally significant and perhaps have specific Cree names. The fens are critical to the Chippewa Cree culture and practices. The field study into wetlands on the Rocky Boy's Reservation identified concerns about fen ecology, springs, and native culture. Perhaps the form and function of the fen wetlands is to support cultural resources in the vicinity. Flooding due to heavy rains and spring run-off could result in the need for additional maintenance and rehabilitation of the roads adjacent to the fens. The mitigation measures can potentially impact fen form and function. The fens are located in the upper elevation but climate change scenarios may drive plants, including wetland plants such as Sweetgrass, into the even higher elevations in response to temperature and precipitation variations.



### Cultural Resources

The following information was presented to the community members for cultural review and input during a mini-conference held on October 23, 2015. Regionally, ice melt is increasing and **exposing** cultural artifacts and remains faster than can be recovered, protected, and remediated. Human settlement was and is typically located close to water. Flood events and increase in the frequency of storms that cause flooding and washout impact those areas. Areas of concern at Rocky Boy's include the **Bonneau drainage** as there are numerous mitigation sites resulting from recent flooding. The changes in hydrology will need to be assessed

to determine, in part, the role of human action. **Wetland mapping and archeological surveying**



are needed for cultural resource protection as climate adaptation measures. Another area of concern is in the upper reaches of **Parker School** development which may have **groundwater** disturbance due to wastewater management. The area needs a groundwater assessment. The location of **culturally significant springs** will need to be paired with groundwater assessment findings. Grassland wildfires are increasing in frequency and severity with potential to destroy and otherwise impact cultural resources. There are ecological benefits of wildfire on the grasslands as, for example, wildfires keep trees from encroaching into the grasslands. Grassland supports biodiversity thereby strengthening the ecosystem, maintaining soil moisture, and providing wildlife habitat. **Plant biodiversity** includes plants of traditional **cultural** value. Traditional plant harvesting plans and policies were developed by the National Park Service that could provide a model for tribal consideration but must support an alignment between **food sovereignty** and climate adaptation. Land erosion resulting from **drought** can reveal new cultural resource sites. In the Beaver Creek drainage, specifically Baldy Butte, there was a change in temperature; it was warm when it was supposed to be cold. The beetle kill advanced and the loss



of trees allowed plant succession in the sacred sites in the Baldy Butte area.

Cultural resources provide information about who we are. Climate change impacts cultural resources. We can prepare for the impact in order to minimize the risk to cultural resources. **Linking elders, holders of traditional ecological knowledge, with the schools** will foster the

history and practices that support natural resource use and management. Tribal elders have firsthand knowledge about living here in Rocky Boy and therefore are the best educators for healthy place-based lifestyles. “It is not our culture to plan for disaster. We are not planning for disaster, we are preparing for resilience and stability.” Additional comment was gained when the Findings from the TEK meeting were reviewed by interns and technical assistance providers on October 28, 2015 at the University of Montana.

The world is calling us to.....Bring together grandparents and grandchildren (for we all are one or the other or both) to share our knowledge and to gain knowledge together on climate change adaptation, our behaviors, and our shared legacy of traditional ecological knowledge. We will connect our individual and collective actions to the Earth. Our heart, our pulse, will be in time with the rhythm of the Earth....Strengthen our connection with nature, now and in the future.

## Review and Findings – CCT TEK Climate Change Adaptation

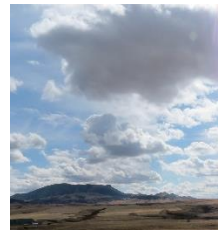
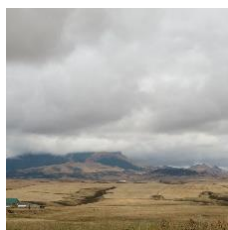
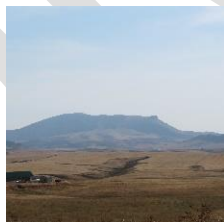
Once you have the knowledge it is your responsibility to pass it on and to follow the teachings. The world is changing and our ways are changing. The teacher drew water from a natural spring and the student gets water through the water line. There are two separate water systems in Rocky Boy, the natural spring water in wells and the treated water delivered through the rural water system. We don't pay for the *water* coming through the pipeline; we pay for its *delivery*. The holders of TEK can teach the younger people about the location of historical springs. There are certain springs that have special properties and value. Teaching about TEK and climate adaptation can include food harvesting sites, critical habitat, and the Cree calendar. [Note: recently, the Cree calendar doesn't always align with the happenings in nature, such as bird migrations, and this is attributable to climate change]. To update the holders of TEK, the youth can present ways to decrease our carbon footprint as well as ways to recycle. Young people need to tell what they want learn about traditional ecological knowledge and climate, and ways to gain the knowledge. Sharing information can become more meaningful when it is carried out with mutual acceptance and tolerance of the different ways of knowing about the planet and our livelihood. One of the best ways to teach and to learn is by direct experience: plant a tree, grow food, clean the neighborhood (again and again and again). Other comments from the meeting:

- “Growing up, we didn't call it ‘living green’, we called it ‘living poor’.”
- Teach a Cree speaker to talk the climate language.
- Plants (vegetation) may move up in elevation and the pollinators need monitoring.

### CLIMATE & FIRE

#### One-week, consecutive days, on the Rocky Boy's Reservation

The following photographs were taken in the same place at the same time on different consecutive days (September 12 – 19, 2017, no photo on the 18<sup>th</sup>). The first photograph is of smoke concealing Centennial. The last photograph appears as a typical September day. The change is fast and evident.



## Rocky Boy Climate

### CLIMATE

Terrain on the reservation ranges from rolling high plains grasslands, which make up the majority of land area, to the sub-alpine environment of the Bears Paw Mountains which are located in the southeast portion of the reservation. Elevations on the reservation range from 2,700 to 6,916 feet above sea level. The reservation is located with the region generally classified as dry continental or Steppe with four well-defined seasons. The weather can be quite changeable with large day to day temperature variations, particularly from fall to spring. Days with severe winter cold and summer heat are typical. The reservation is characterized by moderate summers with cool nights, warm and sunny days and little weather that is very hot or humid. Average **high temperatures in January are 22 to 32°F**. Winters are not as cold as expected of continental locations of similar latitude. The mildest winter conditions are in the Bears Paw Mountains. In winter in particular, temperatures often vary significantly from the averages with significant day to day variations. Temperatures near **-50°F** have been recorded at most locations, while typical **extreme winter minimum temperatures are between -25 and -35°F** during most years. Often the coldest temperatures occur at sheltered valley locations when winds are light, but extreme wind chill situations occur almost every winter when windy conditions coincide with very low temperatures. Sub-zero weather, although not expected to last more than a week or two at a time, is experienced several times a winter. Cold arctic air invasions from the north occur several times during the winter causing sharp temperature drops and heavy snowfall. Frequent southwest winds called Chinook winds or rapid warm-ups are prevalent in the area accounting partially for the milder winters. Chinook winds can rise temperatures forty degrees or more in a matter of hours. Chinook winds prevent great snow accumulations. Throughout the winter the ground is usually bare or nearly bare except for the mountains and the foothills. These rapid warm-ups during the winter and early spring on rare occasion can lead to significant snow melt and flooding of small streams and rivers and/or ice jam flood problems.







**Average high temperatures in July are in the upper 70s to mid 80s°F with average lows in the 50s°F**, with the warmest conditions in sheltered valleys and coolest conditions in the Bears Paw Mountains. Brief spells with temperatures above **100°F** can occur but are often short lived. Temperatures above 105°F have been reported on rare occasions. Weather patterns show that only two out of ten years will have temperatures that exceed 100°F in the months of July or August. Extended periods with temperatures above 90° occur every few years. Freezing temperatures can occur during mid-summer, but are rare except in the Bears Paw Mountains where below freezing lows occur almost every summer. Summer precipitation generally comes in the form of rain showers and thunder storms. Steady rains often occur in the late spring and early summer. **Most of the precipitation falls during the warm period from April to September and is heaviest from May to August. Annual average precipitation is 10 to 13 inches, except up to 20 inches** in the higher elevation of the Bears Paw Mountains. Precipitation can vary significantly from year to year, and location to location within a given year. November through March, are on average quite dry with average monthly precipitation of ½ inch or less. The heaviest most intense precipitation often occurs with localized downpours associated with thunderstorms in June through August. Significant flash flooding can result from these downpours with over four inches of precipitation reported in a few events. Widespread heavy precipitation events of one to two inches can occur every few years and are most common from April through June and September through early November. **Severe thunderstorms are common from June into early September.** Typically the greatest hazards associated with these thunderstorms are very high winds and large hail which cause damage to structures and crops every summer. Tornadoes have been reported, but are relatively rare.

## Rocky Boy Climate (continued)

**Average winter snowfall ranges from 20 to 35 inches**, except over the highest elevations of the Bears Paw Mountains where the average snowfall is over 80 inches. The heaviest snowstorms often occur from **late March through May or mid-October to mid-November**. These storms can produce more than 12 inches of snow and are often made more severe as temperatures are warmer, and therefore the snow is heavier and more difficult to travel through and remove. These storms are often accompanied by high winds resulting in blizzard conditions. In spring these storms can coincide with the calving season resulting in livestock loss. At lower elevations, mid-winter snowstorms in general produce less than 6 inches of snow, but heavier amounts to 10 inches or more have occurred on rare occasions. Even without falling snow, in the colder conditions of mid-winter, high winds can pick up loose snow, resulting in local ground blizzards. On rare occasions storms can produce over two feet of snow in the Bears Paw Mountains. An important element of the climate on the Rocky Boy's Indian Reservation is the often windy conditions. Average wind speeds range from 10 to 15 miles per hour (mph), depending on the exposure of the location. The average and peak sustained winds in the sheltered valley locations tends to be somewhat less than the winds over the higher more exposed terrain in the northern and west central portions of the reservation. **The highest wind gusts often occur with thunderstorms during the summer, with gusts over 60 mph occurring every year.** The highest sustained winds tend to occur in the spring and fall, with sustained winds over 40 mph occurring every year. Strong winds lasting for several days at a time occur in the spring and fall.

*Excerpted from the Tribal Multi-Hazard Mitigation Plan for the Chippewa Cree Tribe of Rocky Boy's Indian Reservation September 2010 North Central Montana prepared by Tetra Tech, Helena, MT.*

TABLE 1 TOP WEATHER EVENTS ON THE ROCKY BOY'S INDIAN RESERVATION					
Wettest Years		Wettest Days		Wettest June	
27.84 inches	1964	6.41 inches	July 14, 1970	10.40 inches	1965
23.73 inches	1970	4.40 inches	June 29, 1965	6.29 inches	1959
22.86 inches	1953	4.05 inches	June 27, 1959	6.06 inches	2010
21.00 inches	1954	4.00 inches	May 30, 1982	5.93 inches	1973
19.70 YTD inches	2010	3.30 inches	August 16, 1968	5.83 inches	1953
Driest Years		Longest Dry Spells			
10.63 inches	1976	45 Days	Ending October 31, 2009		
12.62 inches	1961	45 Days	Ending August 5, 1969		
13.13 inches	1960	42 Days	Ending July 12, 1971		
13.15 inches	1963	38 Days	Ending August 22, 1966		
13.39 inches	1952	38 Days	Ending July 17, 1963		

Source: Data from National Weather Service

## The Master Plan and Preliminary Engineering Report



The flooding of June 2010 resulted in a Presidential Disaster Declaration for the damages sustained in Hill County and the Rocky Boy's Reservation. The Natoose Healing Center, otherwise known as the Rocky Boy healthcare facility, was demolished as a result. Long Term Community Recovery involved partnerships to move construction of the new healthcare facility and flood recovery forward. The Middle Dry Fork area along Upper Box Elder Road was selected by the Tribe as the ideal re-development site in line with tribal planning prior to the flood. The first disaster in 2010 represented a new frontier for FEMA in the intergovernmental working relationship between the federal government and a tribal government. Rocky Boy's was a first for FEMA as the CCT chose to directly administer the disaster funding. In spring, 2013 another flood damaged infrastructure on the Rocky Boy's Reservation and brought a second federal disaster declaration. FEMA (Federal Emergency Management Administration) presence became standard at Rocky Boy's and the Tribe demonstrated a strong, effective emergency response and administration in this second disaster only to be followed by a third flood and subsequent federal disaster declaration again in 2013.





## Climate History at Rocky Boy's and *International Climate Policy and Action*

1910 

The infamous 1910 fire season, Montana's most devastating fire year.

1917-1920 


The drought of 1917 – 1920 meant an end to productive gardening and eliminated most of the employment opportunities on the reservation. During the 1920s, the Rocky Boy's Reservation went through various stages of disaster. Severe droughts and depressed farm prices blocked any attempt to agricultural self-sufficiency.

1930s 

Insect-killed ponderosa pine and Douglas Fir were discovered in the early 1930s.

1935 


Flood

1936 


In 1936 the worst drought in the history of Montana hit the reservation. It wiped out all progress in one year. All the range grass died, there was no hay for winter feed. Insects finished off what the drought failed to kill.



The infestation of tree-killing Ips beetles had reached alarming proportions along the ridge tops and south slopes of about 6,000 acres. All logging operations were to be conducted during the late summer and early fall to help control the infestation. But before this recommendation could be implemented, a fire destroyed the sawmill in the spring of 1938.

1948-49 

Deep Freeze - temperatures in the northern plains fell to record lows.

1956 

Recorded as the driest year on record in the Great Plains.

1973 

The Rocky Boy's Reservation has not had a real hot fire season since 1973.

1978

The 1978 fire season had been one of the slowest in years.

1981 

A grass fire started that burned 800 acres in the vicinity of Bowery Peak.






1984 

Parts of the Rocky Boy's Reservation would be engulfed in flame by the Centennial Fire that started on August 19, 1984 caused by a lightning strike, and burning a total of 11,770 including private land (1,460 acres). By the end of fire, the estimated cost of fighting the fire had reached \$1,339,000.



The summer of 1984 shattered the tranquility of past fire seasons in Montana, becoming one of the busiest and costliest fire seasons in Montana history. That summer all the major fires also exhibited extreme behavior driven by very high winds (measured at 50-60 mph on several of the fires) and very dry fuel moistures.

## Climate History at Rocky Boy's and *International Climate Policy and Action* (continued)

- 1988  June, blow-down, significant wind damage was caused from a tornado that touched down on the reservation after starting south of the reservation in Eagle Creek, touched down by the ski bowl and followed Beaver Creek about one mile.
- 1988  One of the worst fire seasons that Montana and the Greater West had seen since 1984.
-  The Lost Canyon Fire started on August 15, 1988 on a Monday night, when a lightning storm passed across northern Montana.
- 1988 *The Intergovernmental Panel on Climate Change (IPCC) was established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization*
- 1990  The Agency Forest Manager and a U.S. Forest Service staff entomologist assessed the pest impacts associated with areas which were burned. From observing five different locations, they reported observations of negative impacts associated with bark beetles and wood borers.
- 1992 *U.N. Framework Convention on Climate Change (UNFCCC) launched at the Earth Summit in Rio de Janeiro to “avoid dangerous human interference with climate system” and UNFCCC is the key international treaty to reduce global warming, governed by the Conference of Parties (COP), meets annually*
- 1995  The Mountain Pine Beetle (*Dendroctonus ponderosae*) infestation epidemic will decrease species harvested, logging systems employed and harvest locations for approximately 15 years. The infestation began in 1995 in the Sandy Creek Drainage and has extended onto an estimated 13,000 acres in spruce, and lodgepole and ponderosa pine.
- 1995 *IPCC Second Assessment Report set the world stage for the Kyoto Protocol*
- 1995 *The Royal Swedish Academy of Sciences announced the award of the Nobel Prize in Chemistry to Professors Paul Crutzen, Mario Molina, and F. Sherwood Rowland for their findings that indicated, “CFCs...had the potential to deplete the ozone layer to dangerous levels”*
- 1997 *Kyoto Protocol adopted at COP3 to address emissions reduction*
- 1998 *A Call to Action: The Albuquerque Declaration from the indigenous peoples of North America, tabled at the Conference of Parties 4 at the UNFCCC, Buenos Aires, Argentina*
- 2000 *First National Climate Assessment published*

## Climate History at Rocky Boy's and *International Climate Policy and Action* (continued)

- 2000  National Fire Plan of 2000  
Created after wildfires burned 6.5 million acres across the US in 2000 to protect the nation from catastrophic wildfires and restore fire adapted ecosystems so fires would burn less aggressively.
- 2004 – 2014 The United States experienced 86 weather-related disasters, including severe storms, flooding, and drought, with damages exceeding \$1 billion each, according to NOAA.
- 2005  Beginning of a five-year drought
- 2007 *IPCC and Albert Arnold Gore awarded the Nobel Peace Prize*
- 2009 *Mystic Lake Declaration from the Native Peoples, Native Homelands Climate Change Workshop II Indigenous Perspectives and Solutions, Prior Lake, MN*
- 2010  Beginning on June 17, 2010 and lasting for four days, a massive storm cascaded rain on the Rocky Boy's Reservation in northern Montana. A Presidential Disaster Declaration was signed on July 10, 2010 nearly one month after a major rainstorm resulted in flooding on the Rocky Boy's Reservation.
- 2012  Drought was widespread and severe across most of the Northern Plains.
- 2012 *First Stewards Symposium at the Smithsonian's National Museum of the American Indian, National Climate Assessment of 2013 for the first time to include Native American input*
- 2011 & 13  Three floods occurred within three years, all of which resulted in separate federal flood disaster declarations. The first flood occurred in 2010, and the second and third floods in 2011 and 2013. Approximately 150 stream miles were affected by the flooding.
- 2014  A new record for the hottest year ever recorded for the contiguous United States was established in 2014 – surpassing the previous year's record and joining the lineup for the hottest 3 years on record.
- 2015 The United Nations reported that estimates for global costs of storms alone exceeded \$1 trillion over the previous two decades.



## Climate History at Rocky Boy's and *International Climate Policy and Action* (continued)

2017 

East Fork Fire started August 27, 2017 and burned 21,896 acres, including private land.

Both state and federal governments have spent a combined \$378 million this year battling blazes, the most expensive fire season in Montana since at least 1999. It was also the third largest wildfire season in Montana's history, 1.26 million acres have burned, and only the summer of 2012 and the Great Burn of 1910 were bigger. It was a very warm and dry summer and the period from June to August 2017 was the hottest and driest June to August period on Montana record.

The President's Fiscal Year 2017 Budget estimated that the federal government has incurred over \$357 billion in direct costs for managing all of the extreme weather and fire events in the last decade.

### References:

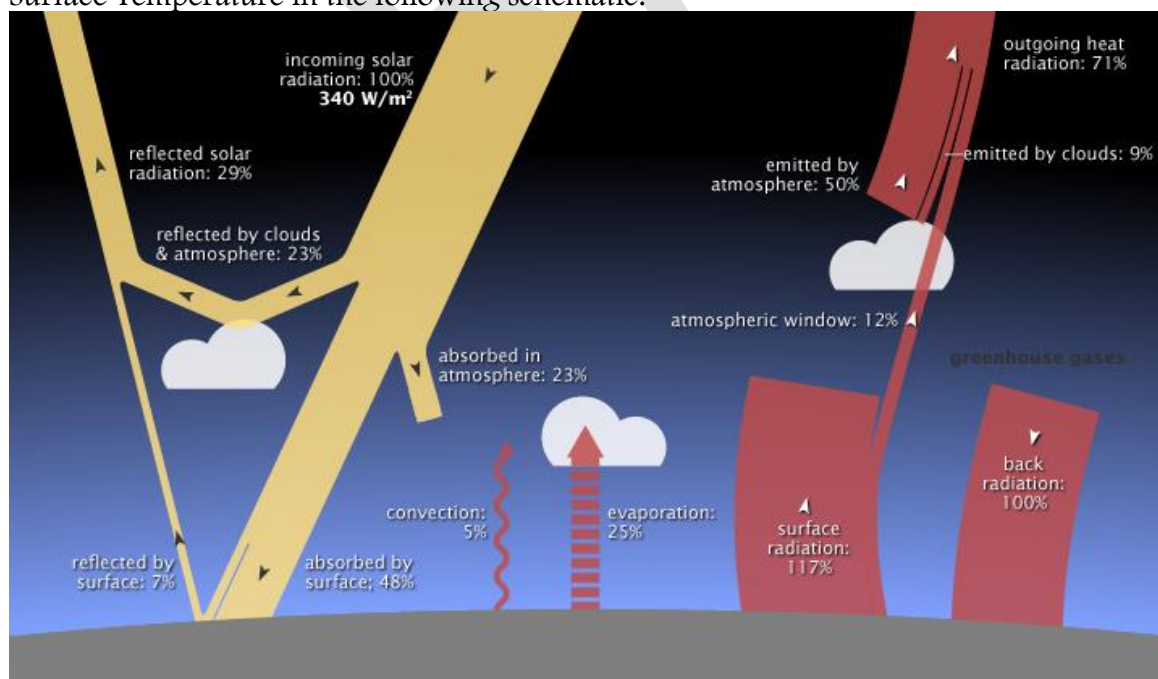
1. Chippewa Cree Tribe, A History of Forest Management on the Rocky Boy's Indian Reservation, Montana 1979-1998, prepared by the U.S. West Research, Inc., BIA, Billings Area Office, Anthony Godfrey, Ph.D., Salt Lake City, Utah.
2. Integrated Resource Management Plan 2012 - 2022, Chippewa Cree Tribe of the Rocky Boy's Reservation.
3. Derner, J., L. Joyce, R. Guerro, and R. Steele, 2015: *Northern Plains Regional Climate Hub Assessment of Climate Change Vulnerability and Adaptation and Mitigation Strategies*, T. Anderson, Eds., United States Department of Agriculture, 57 pp.  
[http://climatehubs.occ.usda.gov/sites/default/files/Northern%20Plains%20Vulnerability%20Assessment%205\\_1\\_2015\\_Compressed.pdf](http://climatehubs.occ.usda.gov/sites/default/files/Northern%20Plains%20Vulnerability%20Assessment%205_1_2015_Compressed.pdf)
4. GAO U.S. Government Accountability Office  
Report to the Honorable Matthew Cartwright, House of Representatives  
CLIMATE CHANGE: Selected Governments Have Approached Adaptation through Laws and Long-Term Plans  
GAO-16-454: Published: May 12, 2016. Publicly Released: June 13, 2016.  
[http://www.gao.gov/extracts/47dabc544580836eaa12957a62d67c7d/rld14\\_image2.png](http://www.gao.gov/extracts/47dabc544580836eaa12957a62d67c7d/rld14_image2.png)  
<https://www.c2es.org/content/history-of-un-climate-talks/>  
<http://www.earthsummit2002.org/toolkits/women/majors/indig/ind1.html>  
[http://www.honorearth.org/climate\\_workshop\\_stresses\\_sustainability\\_indigenous\\_knowledge](http://www.honorearth.org/climate_workshop_stresses_sustainability_indigenous_knowledge)

## Climate Processes



The US Environmental Protection Agency at <https://www.epa.gov/climate-indicators/weather-climate> provides the following definitions. “**Weather** is the state of the atmosphere at any given time and place. Most of the weather that affects people, agriculture, and ecosystems takes place in the lower layer of the atmosphere. Familiar aspects of weather include temperature, precipitation, clouds, and wind that people experience throughout the course of a day. Severe weather conditions include hurricanes, tornadoes, blizzards, and droughts. **Climate** is the long-term average of the weather in a given place. While the weather can change in minutes or hours, a change in climate is something that develops over longer periods of decades to centuries. Climate is not defined only by average temperature and precipitation but also by the type, frequency, duration, and intensity of weather events such as heat waves, cold spells, storms, floods, and droughts.” The Montana Climate Assessment 2017, page 33, defines **climate change** as, “Changes in average weather conditions that persist over multiple decades or longer. Climate change encompasses both increases and decreases in temperature, as well as shifts in precipitation, changing risk of certain types of severe weather events, and changes to other features of the climate system.”

At <https://earthobservatory.nasa.gov/Features/EnergyBalance/page6.php>, NASA’s Earth Observatory presents “**Climate and Earth’s Energy Budget**” that depicts the Natural Greenhouse Effect on Surface Temperature in the following schematic.

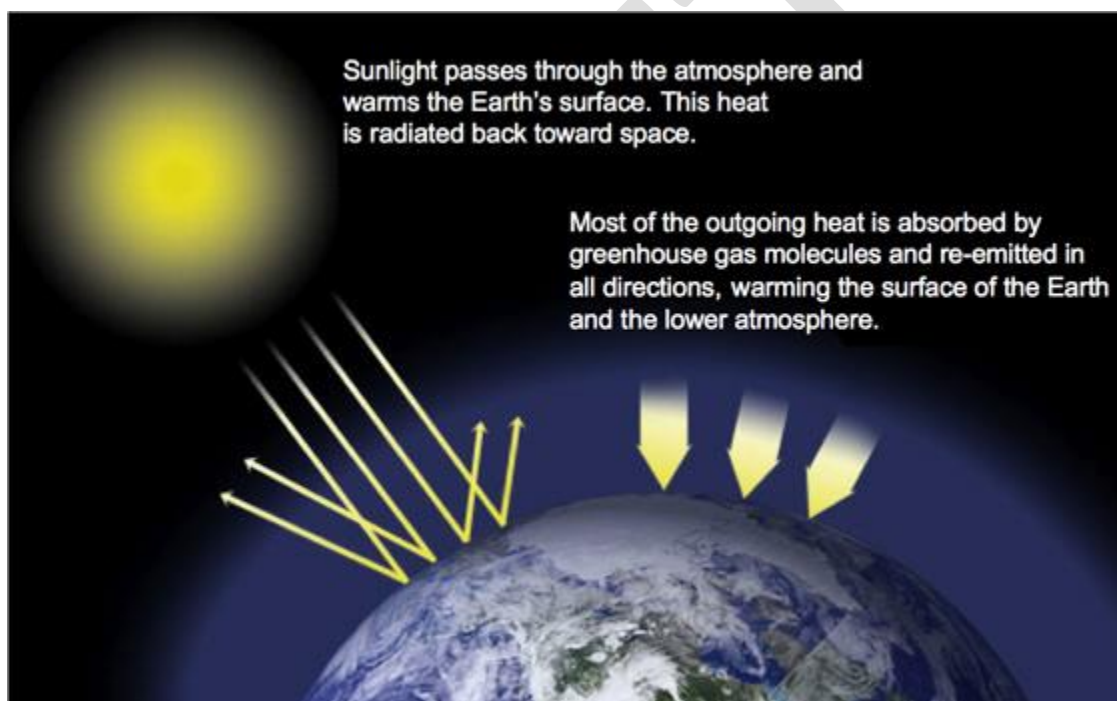


The Earth's temperature is raised about 15° C (or 59°F) on average, more than 30° warmer than it would be if it didn't have an atmosphere. Further in the search, "Climate Forcings and Global Warming" asserts that "[a]ny changes to the Earth's climate system that affect how much energy enters or leaves the system alters Earth's radiative equilibrium and can force temperatures to rise or fall. These destabilizing influences are called climate forcings...Manmade forcings include:

- particle pollution (aerosols), which absorb and reflect incoming sunlight;
- deforestation, which changes how the surface reflects and absorbs sunlight; and
- the rising concentration of atmospheric carbon dioxide and other greenhouse gases, which decrease heat radiated back to space."

Follow the link if you wish to gain a more detailed description of the process.

### Greenhouse Effect, Global Warming, and Climate Change



In reference to NASA's web page "Global Climate Change Vital Signs of the Planet," the energy from the sun supports all life on Earth and about half of the light reaching the Earth from the sun is absorbed by the Earth's surface and then radiated upward as infrared heat. The greenhouse gases (GHG) in the Earth's thin atmosphere absorb the heat and send it back toward the Earth's surface, which is warmed to a life-supporting average of 59 degrees Fahrenheit (15 degrees Celsius). Some gases remain semi-permanently in the atmosphere and are "forcing" climate change. A forcing mechanism is a process that changes the balance of energy in a climate system such as between incoming solar radiation and outgoing infrared radiation from Earth.

Gases that contribute to the greenhouse effect include:

**Nitrous oxide** – a powerful GHG produced by soils cultivation practices such as the use of commercial and organic fertilizers, nitric acid production, and biomass burning.



**Water vapor** – the most abundant GHG, increases as the Earth’s atmosphere warms but so does the possibility of clouds and precipitation, making these some of the most important feedback mechanisms to the greenhouse effect. Climate feedback is a process that increases or decreases direct warming or cooling effects.

**Carbon dioxide (CO<sub>2</sub>)** – minor in amount but an important component of the atmosphere released through natural process and through human activities such as deforestation, land use changes, and burning fossil fuels, and has increased by more than a third since the beginning of the Industrial Revolution; CO<sub>2</sub> is the most important long-lived “forcing” of climate change;

**Methane** – a hydrocarbon gas produced by the decomposition of waste in landfills, agriculture, rice cultivation, and domestic livestock digestion and manure. Methane is less abundant in the atmosphere than CO<sub>2</sub> but is far more active;

**Chlorofluorocarbons (CFCs)** – synthetic compounds entirely of industrial origin, now largely regulated but contributes to the destruction of the ozone layer.

NASA attaches certain effects of greenhouse gases on global warming. On average, Earth will become warmer and the warmer conditions may lead to increased evaporation and precipitation, in general. Oceans will warm and glaciers will melt with a stronger greenhouse effect thus contributing to sea level rise. Crops and other plants may show a favorable response to increased CO<sub>2</sub> by growing more vigorously and with efficient water use although the location of plants and crops may change due to higher temperatures and shifting climate patterns. The U.S. Environmental Protection Agency ties specific questions to the effect of greenhouse gases on climate change:

How much of these gases are in the atmosphere?  
How long do they stay in the atmosphere?  
How strongly do they impact the atmosphere?

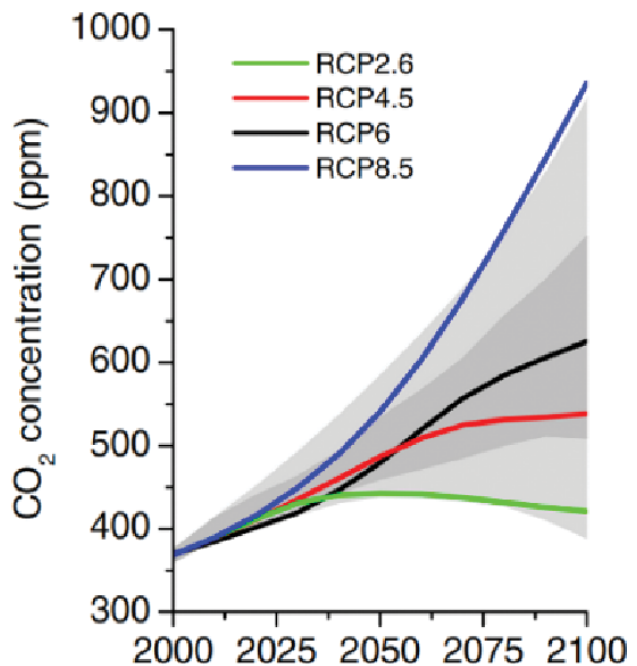
### Representative Concentration Pathways

Representative Concentration Pathways, RCPs, represent a wide range of climate outcomes and are defined by their total radiative forcing, a.k.a. the amount (pathway and level) of GHG emissions accumulated from all sources resulting from human activity and measured in Watts per square meter by the year 2100. The RCPs are based on extensive literature review but are neither bonafide forecasts nor policy recommendations, according to the IPCC Data Distribution Center ([http://sedac.ipcc-data.org/ddc/ar5\\_scenario\\_process/RCPs.html](http://sedac.ipcc-data.org/ddc/ar5_scenario_process/RCPs.html)). The IPCC also responded to the question, “How Reliable Are the Models Used to Make Projections of Future Climate Change?” In the IPCC Fourth Assessment Report: Climate Change 2007, the response was, “*Over several decades of development, models have consistently provided a robust and unambiguous picture of significant climate warming in response to increasing greenhouse gases.* Climate models are mathematical representations of the climate system, expressed as computer codes and run on powerful computers.” See the link, [https://www.ipcc.ch/publications\\_and\\_data/ar4/wg1/en/faq-8-1.html](https://www.ipcc.ch/publications_and_data/ar4/wg1/en/faq-8-1.html).

### Climate Models

The 2017 Montana Climate Assessment (cited as *Whitlock C, Cross W, Maxwell B, Silverman N, Wade AA. 2017. 2017 Montana Climate Assessment. Bozeman and Missoula MT: Montana State University and University of Montana, Montana Institute on Ecosystems. 318 p. doi:*

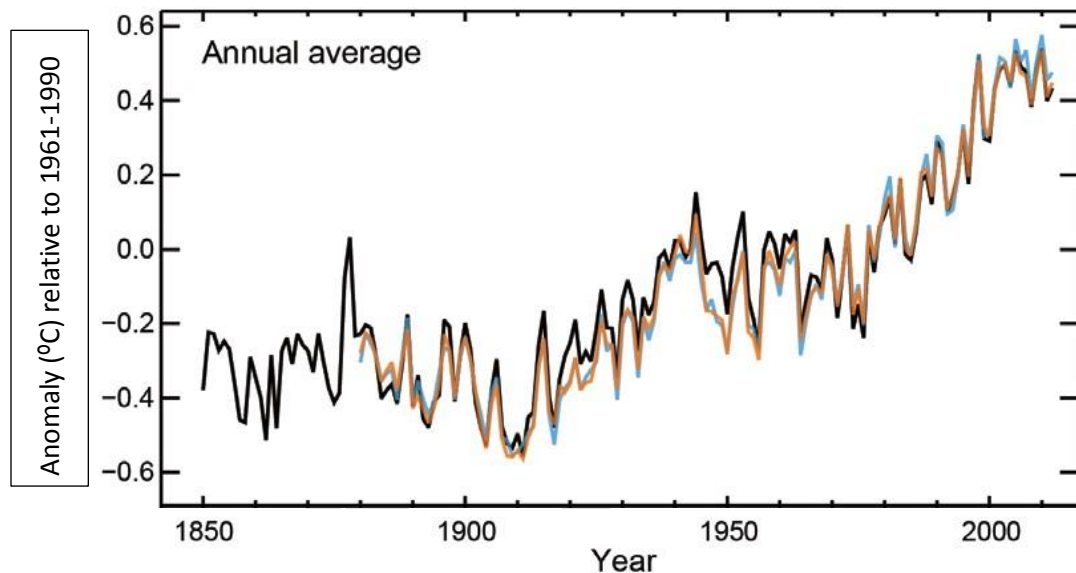
10.15788/m2ww8w.) (page 42)  
 “considered the stabilization (RCP4.5) and business-as-usual (RCP8.5) emission pathways ...RCP.4.5 – The stabilization scenario where technological advancements and strategies lead to a peak in greenhouse gas emissions at about 2040 followed by a decline... RCP8.5 – The business-as-usual emission scenario where greenhouse gas emissions increase throughout the 21<sup>st</sup> century, based on the assumption that society is largely unsuccessful in curbing those emissions...in which greenhouse gases steadily rise, and...best matches current trends...This graph (adjacent, page 43) illustrates the different atmospheric CO<sub>2</sub> concentrations associated with each Representative Concentration Pathways. For example, if we continue our carbon emissions at the current rate (i.e., the business-as-usual [RCP8.5] emission scenario), the atmospheric CO<sub>2</sub> concentration will be roughly 700 ppm by 2075 (IPCC 2014).”



The 2017 Montana Climate Assessment (page 45) figures “forecast Montana’s future climate for two periods: mid-century and end-of-century,

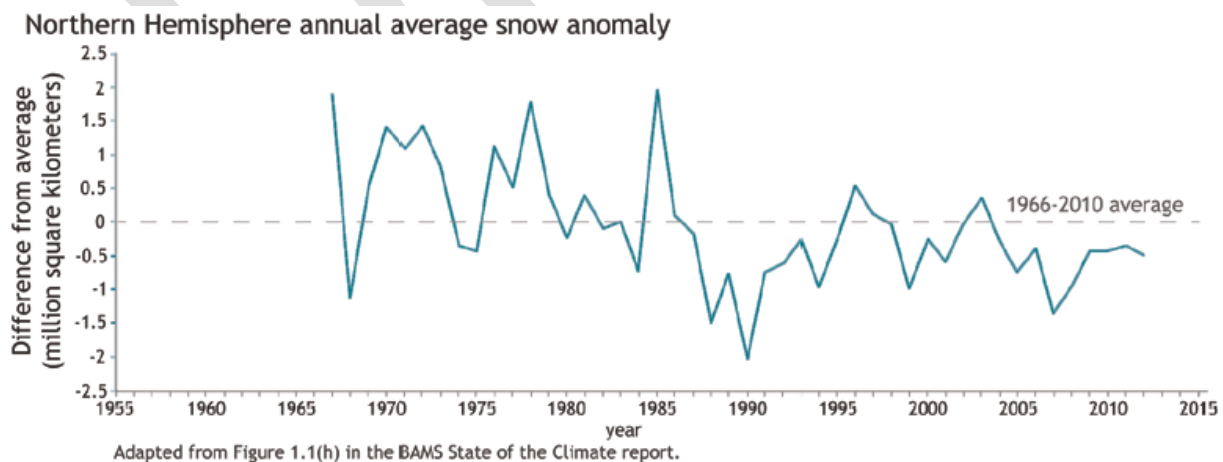
- All models and scenarios show increasing annual temperatures, while most models also show increasing annual precipitation.
- The business-as-usual emission scenario consistently projects warmer temperatures and generally wetter conditions than the stabilization emission scenario.
- The end-of-century period also projects warmer temperatures but similar precipitation changes to the mid-century projections. This finding suggests that temperatures will continue to warm throughout the century, but precipitation changes may level off in the latter half of the century.”

“Climate Change Evidence & Causes” is an overview from the Royal Society and the US National Academy of Sciences released on February 27, 2014 at an event hosted by Miles O’Brien of the PBS Newshour. The graph on page 3 of the publication presents: “Earth’s global average temperature has risen as shown in this plot of combined land and ocean measurements from 1850 – 2012, derived from three independent analyses of available data sets. The **temperature changes** are relative to the global average surface temperature of 1961 – 1990.



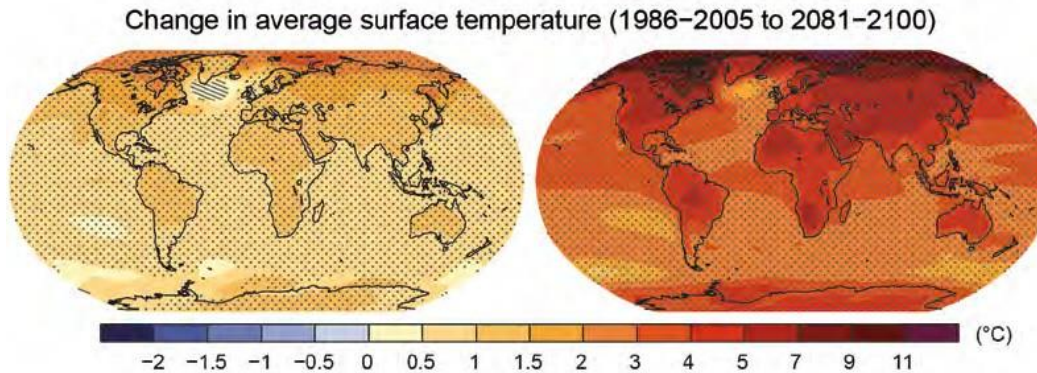
*Source:* IPCC AR5, data from the HadCRUT4 data set (black), UK Met Office Hadley Centre, the NCDC MLOST dataset (orange), US National Oceanic and Atmospheric Administration, and the NASA GISS dataset (blue).

The publication, page 4, also stated, “A large amount of observational evidence besides the temperature records shows that Earth’s climate is changing. For example, additional evidence of a warming trend can be found in the...decrease in **spring snow cover** in the Northern Hemisphere,” as indicated in the following graph (*Source: NOAAclimate.gov*).

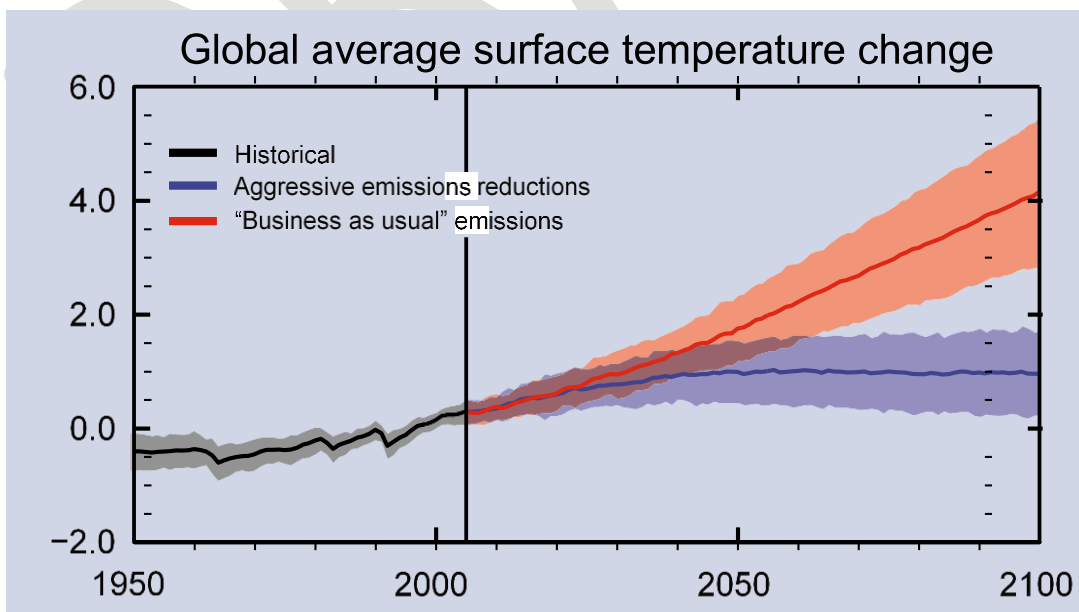




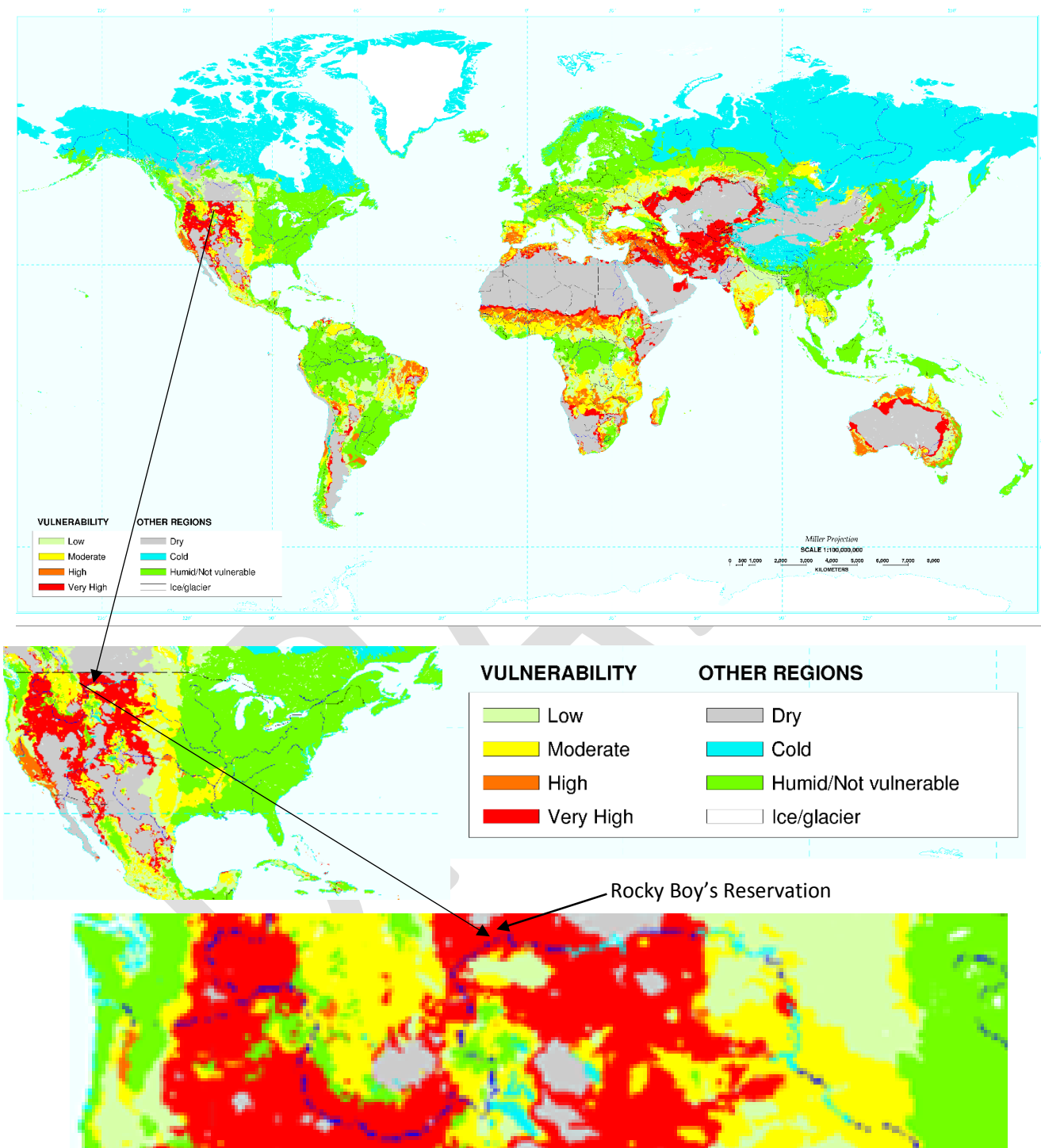
On page 18 of the publication, the following figure illustrates, “If emissions continue on their present trajectory, without either technological or regulatory abatement, then the best estimate is that global average temperature will warm a further 2.6 to 4.8°C (4.7 to 8.6°F) by the end of the century (right). The figure on the left shows projected warming with very aggressive emissions reductions. The figures represent multi-model **estimates of temperature** averages for 2081-2100 compared to 1986-2005. *Source: IPCC AR5.*”



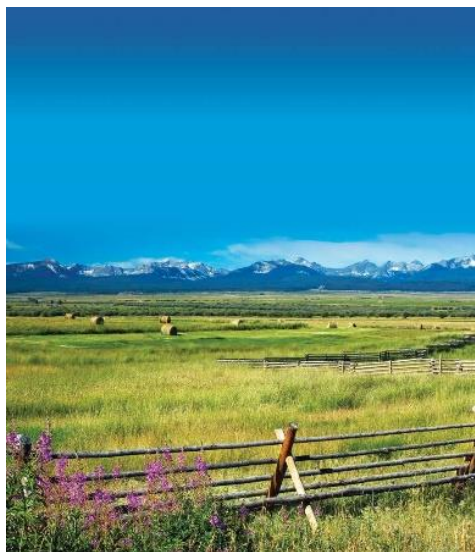
Finally, on page B8, a graph accompanies narrative, “The amount and rate of warming expected for the 21<sup>st</sup> century depends on the total amount of greenhouse gases that humankind emits. Models project the temperature increase for a business-as-usual emissions scenario (in **red**) and aggressive emission reductions, falling close to zero 50 years from now (in **blue**). Black is the modelled estimate of past warming. Each solid line represents the average of different model runs using the same **emission scenario**, and the shaded areas provide a measure of the spread (one standard deviation) between **the temperature changes** projected by the different models. All data are relative to a reference period (set to zero) of 1986-2005. *Source: IPCC AR5.*”



The U.S. Department of Agriculture Natural Resources Conservation Service Soil Survey Division World Soil Resources generated maps relevant to **Desertification Vulnerability** (1998).



## 2017 MONTANA CLIMATE ASSESSMENT



The Montana Climate Assessment with an issue date of September 2017 is self-described as “an effort to synthesize, evaluate, and share credible and relevant scientific information about climate change in Montana with the citizens of the State...This first assessment reports on climate trends and their consequences for three of Montana’s vital sectors: water, forests, and agriculture... (page XXIII).” There are seven climate divisions in Montana as a “subset of the 344 divisions defined by the National Oceanic and Atmospheric Administration (NOAA, undated) based on a combination of climatic, political, agricultural, and watershed boundaries (page XXV).” The Rocky Boy’s Reservation is in the north central climate division 3. The focal river and watershed for climate division 3 is the Marias River near Shelby, MT (page XXX). Climate change may affect key components of the water cycle including (page XXXI):

- Snowpack,
- Snowmelt runoff and timing,
- Annual streamflow,
- Groundwater resources, and
- Drought.

The major findings (pages XXVIII) are presented as excerpts from *Table I. Summary of climate metrics*:

- Global atmospheric carbon dioxide concentrations have increased over 100 ppm since Montana statehood and are projected to increase.
- Since 1950, average **statewide temperatures have increased** by 0.5°F/decade (0.3°C/decade), with greatest warming in spring; projected to increase by 3-7°F (1.7-3.9°C) by midcentury, with greatest warming in summer and winter and in the southeast. Maximum temperatures have increased most in spring and are projected to increase 3-8°F (1.7-4.4°C) by midcentury, with greatest increases in August and in the southeast. Days above 90°F (32°C), a.k.a. “extreme heat days”, are projected to increase by 5-35 additional days by midcentury, with greatest increases in the northeast and south. Minimum temperatures have increased most in winter and spring and are projected to increase 3-7°F (1.7-3.9°C) by midcentury, with greatest increases in January and in the southeast. Frost-free days are projected to increase by 24-44 days by midcentury, particularly in the west. Temperatures across the state of Montana are predicted to increase in all seasons. This has a number of implications. First, warmer winter temperatures will lead to an increase in precipitation in the form of rain and a decrease in snow. This will mean **less snowpack and spring runoff, greatly reducing streamflow in Montana’s rivers and waterways**. In spring, this rise in temperature will contribute to an **increase in growing days**. It is estimated already that in the last few decades the growing season has increased by 12 days. In addition, warmer springs will likely mean



accelerated snowpack. This will also negatively affect summer stream flows. Last, in summer, this increase in temperature will mean a large increase in the number of 90-degree Fahrenheit days that are seen. These hotter summer days and reduced stream flows will exacerbate semi-arid conditions and continue to place communities at **high risk of drought**. In addition, the conditions for **largescale wildfire activity will increase** over the summer season, contributing to larger and more widespread wildfire activity.

- Statewide precipitation has decreased in winter (0.14 inches/ decade [-0.36 cm/decade]) since 1950, but no significant change has occurred in annual mean precipitation, probably because of very slight increases in spring and fall precipitation. **Precipitation is projected to increase**, primarily in spring (0.2-0.7 inches [0.5-1.8 cm]) in the northwest; a slight statewide decrease in summer precipitation and increased year-to-year variability of precipitation are projected, as well. The number of consecutive dry days is projected for little change, with a maximum increase of 3 days to -3 days under the most severe scenario by end of the century. However, **increased variability in precipitation suggests potential for more severe droughts, particularly in connection with climate oscillations**. There is no substantial change projected for the number of consecutive wet days. It is important to note the particular way in which precipitation is increasing and the effects that this will have. **Winter precipitation is expected to increase significantly**. This precipitation increase **will be in the form of rain, rather than snow**. The effect that this will have on Montana's rivers is enormous, as **snowpack will experience a large decline, making Montana more vulnerable to drought**. This will result in a reduced water supply for communities across the state, as well as any community in the United States and Canada that relies upon the headwaters of any river that begins in Montana (this includes the Missouri, Saskatchewan, and Columbia basins), affecting tens of millions across the continent.

### Climate Change Impact Scenarios in Montana

The following subsections (Forest, Agriculture, and Water) were summarized from the 2017 Montana Climate Assessment as previously cited. There are specific chapters for each of the subsection areas and the intent of summarizing was to present the findings that were more relevant to the Rocky Boy's Reservation.

#### Forest

Changing climate is expected to have significant effects on forests in Montana. As temperatures rise, plants and animals looking for cooler conditions will begin to migrate upwards in elevation. This will displace plants and animals which utilize higher elevations and cause a reduction in areas with subalpine and alpine environments. This makes the preservation of these environments of utmost priority, as they are under threat in many areas. In addition, the composition of existing forests is expected to change as a result of temperature and precipitation differences. Lodgepole and Ponderosa pines are expected to become even more prominent in North-Central Montana's forests. While already the dominant tree species in this region, these trees will continue their growth and expansion into higher elevations. Threats to Montana's forests include beetle infestations and wildfire. Both of these threats will be exacerbated given current climate change predictions. **Wildfires will see an increase in size and duration given the predictions of higher summer temperatures and a reduction in summer rainfall and streamflow. Beetle epidemics will spread** as a result of an increase in temperature. While previous infestations may have been stopped due to sustained low winter temperatures that would

periodically kill beetles off, **winters are now predicted to be warm enough that beetles will survive year after year.**

### Agriculture

The **reduction in snowpack expected** to occur across Montana will have an enormous effect on agricultural operations across the state. Less water availability will place a strain on already existing resources, again causing **semi-arid conditions to experience more frequent droughts.** Thousands of Montanan's, especially in the Hi-Line region, rely upon grain, livestock, and pulse crops for livelihood. This reduction in water availability will have overwhelmingly negative consequences for them as **irrigation will face increasing strain.** The predicted increase in temperatures will also have an effect on both pollinators and agricultural pests. Warmer temperatures and a longer growing season will make it much easier for **agricultural pests to spread** and impact Montana's farms and livestock. In addition, warmer winter temperatures will mean that pests and diseases will **no longer be killed off annually by deep-freeze.** One change that has the possibility to benefit the agricultural community in Montana is the change in growing season. An increase in the number of frost-free days has the potential to allow crops that require a **longer growing season** to be grown in Montana in the future. This change is expected to occur most rapidly in the Southern and Eastern portions of the state.

### Water

With an increase in temperature, and a decrease in winter snowfall, water sources will suffer increasing strain given predicted climate changes. **Streamflow will be greatly reduced** across the state, as even Central and Eastern Montana are heavily dependent upon **snowpack** feeding their water sources. **Reduced snowpack** will place increasing strain on existing water sources, including **groundwater sources.** This will mean increased competition for a limited resource. Hotter summer temperatures, with more infrequent precipitation, will exacerbate water shortages in the summer months. This will mean **drought and wildfires** will become even more prevalent throughout the state. Reduced annual streamflow will cause formerly reliable sources of water to become increasingly unreliable. Effects of this will be felt in reduced supplies for drinking water, irrigation, and recreational use, with the scope of these reductions being felt statewide.

## Key Knowledge Gaps Addressing Climate Change in Montana (page 245, 2017 MCA)

### Climate

There are two additional variables requiring more extensive study to assess the impact of climate change: evapotranspiration and drought. The interrelationship between land cover, land use and climate trends also require more assessment as it contributes to evapotranspiration and aridity. **Precipitation timing (winter versus spring and summer) and form (snow versus rain) are critical for forests, agricultural and water resources thus requiring more intense study.**

### Forests

There is a need for better understanding of the direct and indirect effects of climate change on forests. Adaptation options based on data to determine management and future course of action are also needed.

## Water

The MCA 2017 gave significant attention to the direct influences of climate change on water supply, more information is needed on how climate, water demand, and water management interact. Expanding and maintaining the water monitoring network (weather stations, streamflow gages, groundwater wells, and snowpack monitoring sites) is needed to better represent ongoing changes.

## Agriculture

The effects of climate change and the information gaps are greater for agricultural resources than for water and forests. In summary, responses are needed to the following questions:

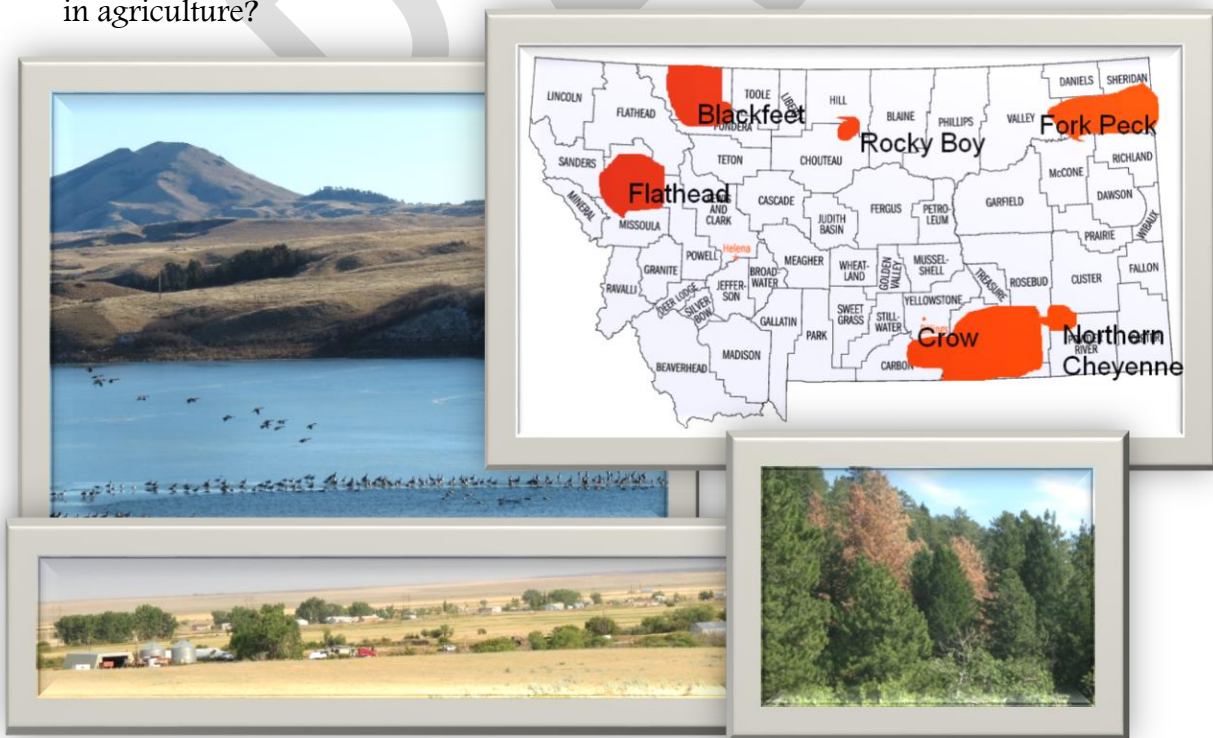
With the high certainty of warming and low certainty of trends in precipitation, how do we develop resilient agricultural practices that prepare for divergent futures?

When and where will irrigation be most disrupted as temperatures rise and water storage declines?

How can protection and restoration of grassland increase resilience to climate change and be integrated into food production?

Which agricultural practices will build soil carbon reserves thereby mitigating greenhouse gases?

How may increased agricultural diversity impact quantity and quality of goods produced in agriculture?





## CLIMATE ADAPTATION ON THE ROCKY BOY'S RESERVATION – BACKGROUND AND VULNERABILITY



### The 2012-2022 Integrated Resource Management Plan for the Chippewa Cree Tribe of the Rocky Boy's Reservation

There are sections throughout the Tribe's Integrated Resource Management Plan that provide information that may be useful for climate adaptation vulnerability assessment and mitigation. As excerpt:

The Integrated Resource Management Plan 2012 – 2022 for the Chippewa Cree Tribe of the Rocky Boy's Reservation located in Box Elder, Montana is the second IRMP for the Tribe. The first IRMP spanned 2000 – 2010. The end of a six-year drought, the spread of the mountain pine beetle infestation throughout the reservation forest, and the 2010 flood urged planning to address climate change for the 2012 IRMP (page 1).

Was the 2010 flood an indicator of climate change?

The **tribal radio station** can provide accurate weather updates.

Developing a **biomass project** [can] include bug kill timber and solid waste to provide energy.

The **Rocky Boy Volunteer Fire Department** will review FEMA programs and funding for staff support and the Department of Homeland Security SAFER program for facility construction. It will be critical for any emergency response facility to have a renewable energy source as either a primary or back up support should a natural disaster

interrupt standard power sources (pages 9 & 10).

**Road conditions** in the forested acres are impacted by floods and must be addressed as a high priority.

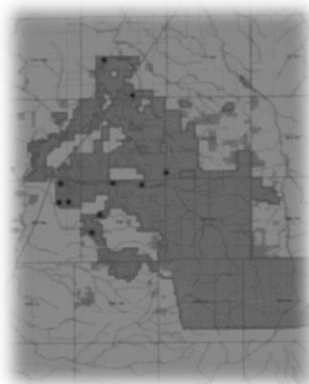
Monitoring temperature extremes in the summer months will indicate the spread of the **mountain pine beetle** over the next fifteen years. The relationship between the infested trees, erosion, temperature changes over time, wildlife, fisheries, forage, and cultural plants must be monitored to identify areas and species of concern so that protection and preventive measures can be taken in relation to climate.

Tribal Natural Resource Department staff requested **T/TA** on the links between hydrology and climate, natural characteristics and indicators, and impact and best management practices (page 11).

There isn't a **shared management strategy** to address climate across the various federal agencies. Policy is not aligned with the science or technology. Intensity and frequency in climate events are expected and **pre-emptive action** would address environmental impact and energy conservation (page 17).

**Monitoring** for climate events and the impacts of such could be carried out by various land managers at set sites throughout the reservation (page 22). The Tribal Natural Resource Department is encouraged to sponsor a **climate conference** that centers on the involvement of the cultural community (page 30).

Bug-killed timber and clay could be utilized for **alternative housing construction**. Determine the effect of **wood stove effluent** on climate (page 34).



By working with various tribal departments that conduct extensive field work, especially the Tribal Natural Resource Department, **climate indicator sites can be mapped** and monitored. Historic climate indicators can be defined prior to the previous droughts and the flood disaster. Climate indicators include precipitation, temperature, snowpack, USGS stream flow rates, native plant characteristics (flowering date and habitat expansion/encroachment) in the wetlands, headwaters location, agricultural crop production, AUM determinations, and dam levels/releases. The NRCS maintains an information base on weather (page 39).

There is less livestock, water, and forage during a **drought**. **Flooding** can destroy critical waterfowl nesting habitat (page 47). **Livestock production** will be increasingly challenged due to increased heat, pests, water stress, diseases and weather extremes (page 71).

The work volume increases for the **tribal realty office** in the aftermath of extreme climate events (page 54).

The **Tribal Noxious Weed Program** encourages climate monitoring as flood and drought require **modification of standard pesticide application practices**. Climate events change plant habitat and weeds may demonstrate **pesticide resistance** (page 60).

**Flooding** of the Rocky Boy's Reservation can **reveal gravel reserves alongside streams** that have flooded and receded. The locations should be noted along with the potential impact development of those gravel reserves could have on stream bank integrity and the surface/groundwater interface. Developing and marketing **hydrocarbons** can contribute to climate change (page 67).

Climate change indicators will be **monitored and documented** to help determine **rate of change** (page 78).

The ARMP will include a **food assessment** and heightened community awareness and decision-making as to the interrelationships between agriculture, **food sovereignty, climate change, food vulnerability, social equity, peak oil, and sustainability** (page 84).

## VULNERABILITY ASSESSMENTS

### Tribal Natural Resources

The December 2017 climate adaptation vulnerability assessment information provided by the Chippewa Cree Tribal Natural Resource Department provided the following update.



**Root rot** is present in the tribal forest.

East Fork **Fire** took a large amount of rangeland out of the **grazing system**.

Warmer summer temperatures are affecting **fish** populations. Stream temperature above 76 °F will kill fish.

An exceptionally dry year led to heavy **fires** and closed the Mountains to activity.

Outside **hay** brought in after the fires was from areas that were not **weed free** and can lead to an increase in noxious weeds.

**Carbon credit** program opportunities need to be defined and fully developed.

There is a goal of establishing a self-sustaining tribal forestry department.

The tribal fire management program will establish more fire crews in the future.

Protecting Sweetgrass in light of climate change is a priority.

The threat from Canadian thistle, an invasive species, will need monitoring.

Forest composition is changing, and there is less lodgepole pine – a financially profitable species, and more hawthorn and aspen.

The deer population is being affected by chronic wasting disease.

The Tribal Natural Resource Department has a set of guidelines that they want other department to follow and use.

Forest management focuses on fuels reduction.

Crop rotation and compliance/enforcement will help prevent erosion and overgrazing.



Also, the December 2017 vulnerability assessment covered **Environmental Health**.

- There is a high human **population** growth predicted that could overly strain environmental health systems during and after climate events.
- After effects of natural disasters include more cases of **mold** in facilities after flooding.
- The **dog** population has potential impact from climate changes.



### **Housing and Climate and Vulnerability Assessment**

The U.S. Department of Housing and Urban Development's "Climate Change Adaptation Plan October 2014, Crosswalk of Vulnerabilities and APPENDIX A: RISK AND VULNERABILITIES ASSESSMENT," <https://www.hud.gov/sites/documents/HUD2014CCADAPTPLAN.PDF> on page 46 states,

The department has a unique role in Indian Country funding a variety of services infrastructure. According to the National Climate Assessment, 'Climate change impacts on many of the 566 federally recognized tribes and other tribal and indigenous groups in the U.S. are projected to be especially severe, since these impacts are compounded by a number of persistent social and economic problems. The adaptive responses to multiple social and ecological challenges arising from climate impacts on indigenous communities will occur against a complex backdrop of centuries-old cultures already stressed by historical events and contemporary conditions (page 298).'

#### **Consequences from Extreme Weather Events**

- Natural disasters may expose environmental hazards that were under control during ordinary conditions.
- Mold and mildew
- Power outages and loss of power
- Transportation outages
- Loss of cellular service
- Combined sewer overflow
- Surface/groundwater pollution from run-off
- Climate change is likely to increase the occurrence of weather-related natural disasters and to disrupt patterns of occurrence in terms of geography. This not only means that communities will face a greater number of hurricanes and severe storms; it also means that communities that never faced such disasters in the past will face them in the future.

### Vulnerability and Extreme Weather Events:

- The physical infrastructure toll can be immense and alter the water supply, power, transportation links, and roads, and bridges. This can disproportionately impact HUD-assisted projects.
- Grantees might not have the capacity to run a disaster program.
- Extreme weather events can shift program priorities to quickly address needs, and require amendments to action plans (can be a timely process).
- Misunderstandings between federal partners and governments frequently arise around how available resources can be used and limitations within those resources.
- Stormwater, erosion, mudslides, or unstable ground infrastructure may impact the construction of new homes (jeopardizing already spent funds and expenditure deadlines) or foundation of existing homes.
- Extreme weather events can hinder effective response and jeopardize lives and property, shift program priorities to quickly address needs through short-term fixes to urgent problems, rather than focusing on larger scale coordinated solutions.



- There is no ready mechanism for information distribution that does not rely on power and/or smartphone cellular service in a post-disaster environment. Therefore, loss of power and government office closures prevent vulnerable populations from accessing much needed information on resources, leaving them open to predatory contractors and other entities who seek to profit from disaster.
- In Presidentially-declared disaster areas, Emergency Capital Funds are prohibited from being used and FEMA Public Assistance funds must be used instead, but these are often inadequate, slow to arrive, and their amount is complicated by real or potential insurance proceeds, whether or not those are realized.
- Many minority persons and persons with disabilities live in segregated, concentrated areas of poverty and/or in substandard housing which may be especially prone to adverse weather conditions. They may also be more likely to be exposed to the release of hazardous materials and other pollutants in the air and water during a disaster due to the disproportionate likelihood that they are located near landfills or industrial sites or contain poorer-quality housing. The communities and buildings are more likely to have fewer resources to adapt to climate change or recover from sudden weather-related events. Such communities and individuals may disproportionately rely on federal assistance to overcome these conditions.
- Office closure due to extreme weather could mean closing down housing counseling facilities, resource facilities, and others.
- Climate change may cause damage to homes and community infrastructure and may lead to rebuilding of communities in ways that contribute to or perpetuate patterns of residential segregation.

## Droughts and Extreme Weather Events

### Vulnerability:

- Drought is an economic crisis that disproportionately affects rural populations because many of them are heavily dependent on agriculture and livestock for their livelihoods. Indian homes are more likely to be overcrowded, lack complete plumbing and require delivery of potable water. Droughts generate dust, exacerbating lung conditions such as asthma, which is more prevalent in low-income communities. Indian tribal governments and Indian communities will likely be competing with state and local jurisdictions for rights to precious local water supplies.
- Drought conditions resulting in water crisis could prevent communities from having water for harvest, daily usage, or construction projects may be slowed down. This can lead to failure to accomplish program goals/requirement, which can mean no help for intended final program beneficiary and a finding of noncompliance for a grantee.

### HOUSING ADMINISTRATION

Vulnerability	Impact
Flood	Destruction of public records
Winter storms	Cost of heating fuel, road closures that further isolate and endanger survivors, and hamper rescue efforts
Temperature shifts	<ul style="list-style-type: none"><li>• Costs for energy retrofits and housing rehabilitation are prohibitive;</li><li>• Short construction seasons;</li><li>• Building codes; and</li><li>• Superficial or structural damage to buildings due to heat and cold stress outside their engineering tolerance.</li></ul>
Extreme heat	Lack of air conditioning poses health risks. Relocation would be a cultural disaster, depriving many families of the support network and exacerbating an array of social ills.
Changes in precipitation	Flooding and wildfires might disrupt or destroy a project that is under construction, increasing project costs, jeopardizing already spent funds and expenditure deadlines. Water costs might increase during periods of drought and impact the use of funds. Forest fires might interrupt forest harvest or recreation hampering key rural economic development drivers. Changes in traditional water patterns could render prior investments worthless by forcing relocation away from infrastructure.



The **Chippewa Cree Housing Authority** responded to the December 2017 vulnerability assessment. Almost the entirety of the housing budget comes from HUD, there are significant restrictions on what HUD allows and doesn't allow in a budget. Under the NAHASDA program, the tribal housing authority is currently operating with only about 2 million dollars a year. There is an extreme housing shortage, overcrowding in existing stock, and a long waiting

list for new houses. Crowding in Middle Dry Fork (more areas for housing development need to be identified), with population growth estimates, Middle Dry Fork will not be enough land for the population base. Meth contamination has led to a reduction in housing stock and is often too costly for housing to undertake.

- The housing authority relies upon other departments (such as for **sewer, storm water management, and roads**) in order for houses to be livable. When those systems are impacted by climate changes and events, housing is also impacted.
- Risk of floods and damage from storm water runoff means **grading** needs to be done around homes. This is costly, run between \$6-7,000 per home.
- Based on the shortage, overcrowding, and waiting list for new houses, the housing authority is anticipating **higher needs** for water, roads, and sewer; this is contingent upon other departments.
- Some programs have begun **home retrofit** with green appliances and winterization. This is something that housing would like to do more of in the future, but funding sources need to be in place.





## FLOOD



The **Tribal Water Resources Department** responded to the December 2017 climate adaptation vulnerability assessment.

- This year there was a lack of **precipitation**, other years (flood years) there was too much precipitation.
- This year's drought caused a (designated) perennial stream to stop flowing and **flow measurements** could not be taken as there was not enough water.
- **Sweetgrass** areas have stunted growth due to less moisture as a result of climate.
- **Soil health** is of concern as a result of climate.
- Increase in weeds, and spraying for weeds, has led to **contamination** in runoff.



## DROUGHT

- Beetle kill, logging, and deforestation impact **streambank** stabilization, stream temperature, and water quality.
- It takes about three years to form conclusions about **data** due to snowpack unpredictability.
- Reforestation and re-seeding needs to take place to ensure **healthy ecosystems** throughout climate change.
- Reduction in **fish** species and changes in species has occurred perhaps as climate adaptation.
- A portion of **stream** has been re-classified from a cold-water stream to a warm-water stream.
- Box Elder Creek **water quality monitoring** is emphasized as a result of changing climate.
- **Water quality standards** will be updated in 2018.
- Addressing climate change has been written into **work plans** administered by TWRD.

The Tribal Water Resources Department's Environmental Protection Office administers the US EPA funded **Wetlands Protection Program**, a discretionary grant program the Chippewa Cree Tribe has received for years. Most recent wetlands protection addressed fen wetlands and Sweetgrass. Wetlands delineation, plants, and protective mechanisms such as codes were addressed in the early years of the Tribe's wetlands program.



*Parker Canyon wetland, above*

A fen is a particular type of wetland area that receives the majority of its moisture from groundwater. This makes fens unique amongst other wetland types as they do not necessarily only form in areas of high precipitation. It is this unique formation that allows this particular wetland area to exist in Rocky Boy, most of which is classified as a semi-arid climate. While fen areas in Montana are not particularly extensive, they are an important environmental feature and occur throughout mountainous areas of the state. With their unique soil characteristics, largely dependent on a thick layer of peat, as well as a higher water content, fens are some of the most ecologically diverse areas in Montana. They provide a unique habitat for much of the

plants that populate them. These plants would otherwise not be able to survive such an arid and extreme climate; however, the higher water content and nutrient rich peat soil provide a suitable habitat. It is important to note though that fens have uniquely varying degrees of richness in terms of plant and animal habitat, and they can be categorized anywhere from “poor” to “rich and extremely rich” in terms of habitat quality and ecological diversity. The Parker Canyon fen and the upper Beaver Creek fen have strong cultural significance.

Sources: <https://www.smithsonianmag.com/science-nature/how-will-the-wetlands-respond-to-climate-change-164048534/>

[http://fieldguide.mt.gov/displayES\\_Detail.aspx?ES=9234](http://fieldguide.mt.gov/displayES_Detail.aspx?ES=9234) ; <http://deq.mt.gov/Water/WPB/Wetlands/fenwetland>

[https://www.fs.fed.us/wildflowers/beauty/California\\_Fens/what.shtml](https://www.fs.fed.us/wildflowers/beauty/California_Fens/what.shtml)

[http://www.wetlandtrust.org.nz/Cache/Pictures/2280012/Northland\\_Fens.pdf](http://www.wetlandtrust.org.nz/Cache/Pictures/2280012/Northland_Fens.pdf)

“MTNHP.” *Montana Field Guide*, fieldguide.mt.gov/displays\_Detail.aspx?ES

“Fen Wetlands.” *Montana DEQ>Water?WPB>Wetlands>Fenwetland*, Montana Department of Environmental Quality, deq.mt.gov/Water/WPB/Wetlands/fenwetland

*What is a Fen?* US Forest Service, [www.fs.fed.us/wildflowers/beauty/California\\_Fens/what.shtml](http://www.fs.fed.us/wildflowers/beauty/California_Fens/what.shtml).

“Monitoring Alkaline Fens.” *TemaNord Alkaline Fens*, Nov. 2016, pp. 31-32, doi:10.6027/9789289345125-10-en.

There is a connection between the wetlands and the beaver dams that begs the question, “When, if ever, do beaver dams establish wetlands?” The beaver dams and wetlands at Rocky Boy’s are critical for water-related climate events such as floods and droughts. The wetlands can absorb waters during heavy precipitation (to offset flooding as much as possible) and release water during drought. The beaver dams can control water flow by storing the water during heavy precipitation, although the dams can break and thereby become a contributing factor to flooding. This can be a significant threat when several dams break in the higher elevation within one drainage.







A natural resident of wetland and riparian zones, beavers can have a surprisingly significant effect on riparian and wetland systems. With smaller creeks and headwaters, such as those seen on Rocky Boy's, beavers can exert a significant amount of influence. The link between beavers and flooding is a relationship that is receiving increasing amounts of attention. Beaver dams have been blamed for an increase in flooding of certain areas. This flooding can have a particularly negative effect on roads and individual property. However, they are also quite beneficial from an

environmental perspective. Beavers are a natural ally of the wetland ecosystem. Their ability to construct dams and lodges is one of the few ways in which freshwater wetland ecosystems are able to be restored naturally. These unique, and increasingly threatened, ecosystems have a symbiotic relationship with the beaver, as the beaver is one of the few ways in which this ecosystem is allowed to expand. In addition, freshwater wetlands are some of the greatest groundwater resources. With a healthy beaver population present, this groundwater store is more resilient to climate change. The relationship between humans and beavers does not necessarily need to be adversarial. In fact, there are ways in which the two can live together in a mutually beneficial way. The use of wire fencing to prevent beavers from inhabiting certain areas is an effective means to control where they inhabit. This can be used as a control measure, to ensure that beavers do not directly impact certain areas. In addition, education surrounding the beaver can help dispel common misconceptions. For example, one family of beavers may have several different lodges, this may cause people to think there are many more beavers in an area than there actually are.

Sources: "Wetland Engineer>>Beavers : Wetlands & Wildlife." Beavers: Wetlands & Wildlife, [www.beaversww.org/beaver-and-wetlands/articles/wetland-engineer/](http://www.beaversww.org/beaver-and-wetlands/articles/wetland-engineer/).  
<http://www.beaversww.org/assets/PDFs/Brownrevised.pdf>  
<http://www.beaversww.org/beavers-and-wetlands/articles/wetland-engineer/>





At the local level on the Rocky Boy's Reservation, vulnerability assessment focused on how climate change is impacting three distinct resources, or assets – wetlands, water quality and housing. The main concerns were:

- Global warming, drought, roads, land use, overgrazing, unregulated activities, and noxious weeds and invasive species flowering periods are changing.
- Historical wetland designation sties need to be “field-truthed” with notes made on transformation rate and contributing factors. For example, Sweetgrass may have grown in a specific wetland in the past but now is no longer found there. The site would now have “historical wetland designation” due to being a previous location of a cultural resource.
- Riparian hay meadows are at risk based on information gained by monitoring wetlands and Sweetgrass.
- A native seed bank could be feasible and any study would also address Sweetgrass, additional seed bank research, scopes of work/budget for a seed bank, cone collection, stream restoration, cultural resources, berries, diabetes prevention, gardening, and fens.
- Are the pH ranges for fens changing as a result of climate? Does it depend on the location as the temperature may be higher at the Parker Canyon fen than at the fen in upper Beaver Creek. Would this constitute a predictive model that connects temperature with fen pH?
- GIS maps show there were 40.6 acres of wetland in the 1950s – 80s that produced Sweetgrass and that has decreased to 2.6 acres in 2017. The scenario supports historic wetland designation. For example, the wetlands that used to produce Sweetgrass would be defined with historic designation due to the cultural significance of the plant, even though it is no longer produced at that particular site.
- Created/constructed wetlands meet “no net loss” and can be used for wastewater management.



- The Tribal Wetland Protection Program is requested to do more study on the impact of climate changes on wetlands located on the Rocky Boy's Reservation.
- The Chippewa Cree Housing Authority will need more help identifying wetlands when developing new home sites.
- There is a link between water quality, housing, and wetlands as demonstrated by wastewater management in the Parker School area. Seven individual septic systems combined into one system and almost created a wetland. The TWRD and CCHA need to form a partnership for a research design that would compile and consolidate all of their information regarding waste water and drinking water infrastructure, housing, soils, wetlands, and maps.
- What is the best use of SCATA in relation to climate change?
- Define the relationship between CCHA and the tribal public works department in relation to climate events.
- What and where are existing sources of renewable energy? This information is needed in case of prolonged power disruption due to climate events or disasters.
- A tribal entity needs to be charged with monitoring the existing on-reservation solar energy use.
- What is the agreement between HCE and the CCT for renewable energy use on the reservation and renewable energy credits?
- What are the existing opportunities to address carbon footprint forestry credits?
- How does the CCT's climate adaptation plan correlate with the interests of Hill County Electric Cooperative? What is HCE's position on and action steps for climate change adaptation? This may be tied closely to hydropower and microhydropower.
- What is our storage capacity for water, sand, and gravel?
- Springs surface, break out, in drought years.
- Storm water runoff into Box Elder Creek diminishes the historical water quality.
- Where are the groundwater monitoring wells for methane and natural gas?
- Natoose Springs need to be fenced.

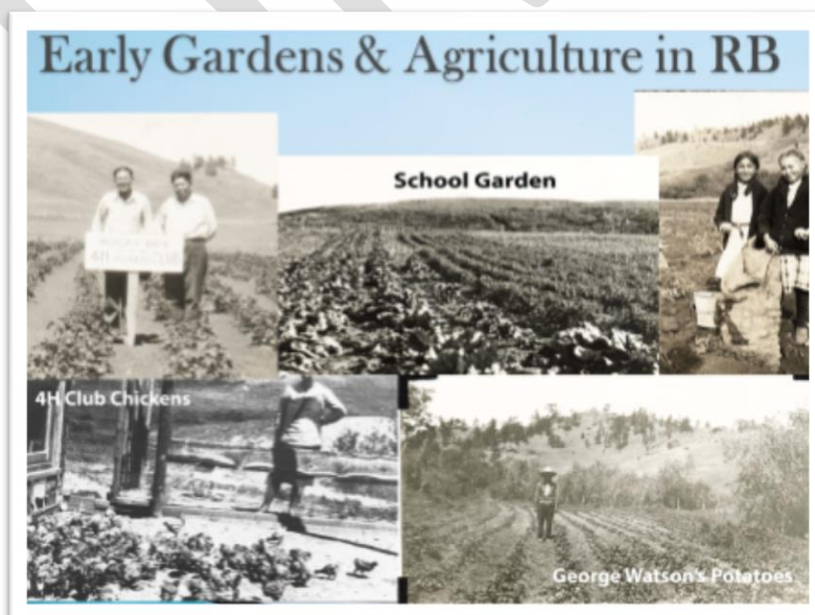
## Food and Climate

Food sovereignty was also addressed within the December 2017 vulnerability assessment.

- There is uncertainty over the long term on what changes will occur.
- Changes in precipitation, such as precipitation patterns, affect crops.
- Long term drought is affecting area crop productions.
- Rapid population growth is anticipated to greatly affect the food system.
- The demand for water and treated water is expected to increase.
- Changing climate conditions may affect what crops can be grown outdoors.
- Plant monocultures in region could be problematic.
- Conservative culture in surrounding areas of Montana could reduce some ability to adapt on a regional scale.
- There is interest in starting a food sovereignty program and plans for a greenhouse and garden expansion.

**Food sovereignty** is the right of people, communities, and countries to define their own agriculture, labor, fishing, food and land policies which are ecologically and culturally appropriate to their unique circumstances. It includes the true right to food and to produce food, which means that all people have the right to safe nutritious and culturally appropriate food and to food-producing resources and the ability to sustain themselves and societies.

~ Food Sovereignty: A Right for All.  
Political statement of the NGO/ESO Forum for food sovereignty.  
18June2002, Rome



People are considered **food secure** when they have availability and adequate access at all times to sufficient, safe, nutritious food to maintain a healthy and active life. Food security analysts look at the combination of the following three main elements.

Food availability: Food must be available in sufficient quantities and on a consistent basis. It considers stock and production in a given area and the capacity to bring in food from elsewhere through trade or aid.

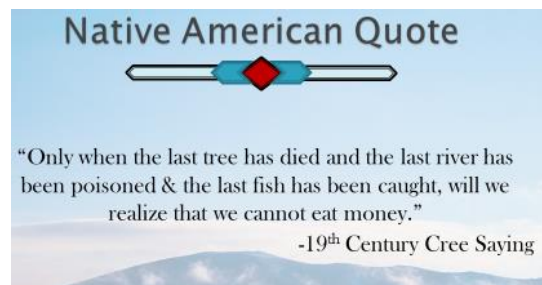
Food access: People must be able to regularly acquire adequate quantities of food, through purchase, home production, barter, gifts, borrowing or food aid.

Food utilization: Consumed food must have a positive nutritional impact on people. It entails cooking, storage and hygiene practices, individual health, water and sanitation, feeding and sharing practices within the household.

- World Food Programme, *Fighting Hunger Worldwide*, 2018, <https://www.wfp.org/node/359289>



Along with organizing the above “Food Security related to Seasons,” interns proposed the following questions as they worked on climate change adaptation: How does our food get from seed to table? What plant and animal species and ecosystems exist in Rocky Boy? What culturally relevant plants exist? Which are rare, declining, or otherwise significant? Where precisely are those found? What do they need to survive and thrive? Who manages those places? What is their condition? Is prioritizing these plant and animal species necessary? What is to be done if any of the species are under attack or at risk due to climate change? How will implementation of action be made? How much food do we need for a healthy survival of our own people at Rocky Boy’s? What can we grow in Rocky Boy to meet that need? In conclusion, the interns quoted:





## Assets, Infrastructure and Support Systems, Health and Safety, and Security

USAID (United States Agency International Development) from the American People, “Climate Change Adaptation Plan June 2013” was prepared in accordance with Executive Order (E.O.) 13514 “Federal Leadership in Environmental, Energy, and Economic Performance.” <https://www.usaid.gov/sites/default/files/documents/1865/Agency%20Climate%20Change%20Adaptation%20Plan%202012.pdf> From the USAID position, the plan assesses climate change risks, vulnerabilities, and opportunities for mission, programs, and operations; discusses current and past adaptation activities; and identifies agency-level actions to understand and address climate change vulnerability (page 3). The vulnerability assessments (pages 16-21) cover assets, infrastructure and support systems, health and safety, and security. The presentation applies to the Rocky Boy’s Reservation

Assets are defined as buildings, equipment, facilities, and vehicles.

### Potential Climate Change Impacts on Assets

- Temperature Change
  - Premature deterioration of building materials due to thermal stress, biochemical activity, freeze-thaw, etc.
  - Changes in the dimension or shape of building materials and equipment from cracking and fissuring
- Precipitation Change
  - Increased precipitation may result in:
    - Seepage and flooding in building interiors
    - Destruction of building due to landslides
    - Physical changes to building materials and finishes and increased prevalence of mold and fungi
    - Corrosion of metals
    - Sewage overflow
  - Decreased precipitation may result in:
    - Increased soil cracking and sinking in areas with clay soils and reduced soil moisture
    - Inadequately functioning and/or stressed water and waste systems caused by inadequate water supplies
- Extreme Events
  - Reduced durability of exterior surfaces due to erosion and weathering
  - Accelerated deterioration of building shell due to increase in dust, particulate matter, and smoke

Infrastructure and Support Systems include information and communications technology, transportation, and utilities.

### Potential Climate Change Impacts on Infrastructure and Support Systems

- Temperature Change
  - Transmissions Infrastructure
    - Sinking and tilting of telecommunications towers due to unstable soil
  - Wireless Signals
    - Decreased range of wireless signal transmission, resulting in the location/density of wireless masts becoming suboptimal
  - Buildings and Equipment
    - Overheating of data centers, exchanges, based stations, etc.
- Precipitation Change
  - Transmission Infrastructure
    - Flooding of low-lying/underground infrastructure and access, particularly in floodplains
    - Exposed cables/trunk routes due to erosion or damage of transportation infrastructure
  - Wireless Signals
    - Reduced quality and strength of wireless service due to increased rainfall
    - Changes in reference datum for telecommunications and satellite transmission calculations
  - Buildings and Equipment
    - Changes in requirements to maintain internal environments of system devices due to changes in humidity
    - Closure or reduced access to low-lying buildings due to permanent or temporary flooding



## Potential Climate Change Impacts on Transportation Infrastructure



- Roads
  - Temperature Change
    - More rapid road and parking lot black top deterioration
    - Increased maintenance and construction costs due to thawing and permafrost
  - Precipitation Change
    - Increased flooding of roadways and driveways
    - Increased soil erosion and washout of road and culverts during flash floods
    - Facilities closure due to lack of access
  - Snowstorm
    - Erosion of road base
    - Residents can become isolated from critical goods and services due to drifted driveways
  - Extreme Wind
    - Damage to road-side signage and lighting
    - Road closures and increased safety hazards due to debris



Climate changes could result in less reliable and more expensive utility services. Impacts on supply systems could increase energy prices. Increasing temperatures may cause additional cooling requirements resulting in further increased energy costs. Increased demand and extreme weather events could increase the frequency, severity, and reach of blackouts. Increased temperatures, extreme flooding, and drought could all degrade water quality and availability. (Page 19) Furthermore, in areas with no increase in precipitation, increased temperatures would also increase evaporation in reservoirs and potable water supplies. Sewage systems are subject to overflow.

#### Potential Climate Change Impacts on Utilities

- Energy
  - Temperature Change
    - Increased capital costs for building new generation, transmission, and distribution infrastructure to support greater demand
    - Changes in hydropower (e.g., changes in snowpack melt)
  - Precipitation Change
    - Disruption in fuel transportation through damage to infrastructure (e.g., flooding, pipeline damage)
  - Extreme Events
    - Disruption of operations (e.g., temporary shutdown)
    - Change in capacity for solar and wind power
    - Damage to power lines
- Sanitation
  - Temperature Change
    - Lower water quality from increase algal blooms, pathogens, and lower dissolved oxygen
  - Precipitation Change
    - Inundation of outfall causing discharge to back-up
    - Damage to collection systems and treatment facilities by flooding
  - Extreme Events
    - Prolonged drought leads to lower flows in receiving streams, reducing the capacity of water resources to absorb and dilute pollution, impacting treatment performance
- Solid Waste Management
  - Temperature Change
    - Increased odor and pests requiring more frequent waste collection
    - Overheating of collection vehicles and sorting equipment
    - Increased risk of fire at disposal sites
  - Precipitation Change
    - Flooding of collection routes and access road
    - Increased need for enclosed or covered facilities
  - Extreme Events
    - Extreme wind leads to dispersal of waste from collection sites, collection vehicles, processing sites, and transfer stations



Health and Safety vulnerabilities and risks related to climate change can be life threatening, impact well-being by the changing patterns of diseases and exposure to contaminated water.

### Potential Climate Change Impacts on Health and Safety

- Temperature Changes
  - Heat stress/stroke or hyperthermia
  - Respiratory diseases due to changes in ground-level ozone, particulate matter (PM), and allergies
  - Increased risk of diseases due to changes in the ranges and activity of vectors and parasites
- Precipitation Changes
  - Reduced water availability
  - Flooding contaminates water and food supplies with pathogens
  - Increased risk of diseases due to changes in the ranges and activity of vectors and parasites
- Extreme Events
  - Increased injuries from flying debris during storms with high winds
  - Reduced water and food availability
  - Interruption of communication, utility, and health care services

### Security

Finally, climate change could exacerbate the conditions for unrest by:

- Further reducing already limited resources like food and water,
- Forcing temporary or permanent migration of communities, or
- Fostering unsafe situations if services are disrupted in the event of disaster, particularly for at-risk populations.



## CLIMATE ADAPTATION: DISASTER AND EMERGENCY RESPONSE

There is a need to update emergency response plans, including tabletop exercises, preferably on a seasonal basis. In the winter months, the main concerns are snow, cold, and access to services. Preparation in the spring is focused on possible flooding. The summer can bring hail or drought, both causes for concern. In the fall, it is not unusual for wild fire or early snow. The experiences of making it through snow storms, drought, fire, and floods have strengthened the emergency response. The disaster and emergency services and response are addressed at meetings held throughout the year. The Chippewa Cree Tribe is building up its organizations such as the Rocky Boy Volunteer Fire Department and the Tribal Emergency Response Committee to effectively and efficiently address emergencies including those related to climate. The responses could minimize the impact from climate events while they are happening and in the recovery phase.



The Chippewa Cree Tribe reactivated the Tribal Emergency Response Committee (TERC) and requested an update of the Emergency Action Plan/Emergency Operations Plan. The purpose is “to provide for the coordination of emergency response activities for the Rocky Boy’s Reservation, including the facilities, staff and standard operating procedures to facilitate coordination of emergency management activities, to facilitate policy formulation, establish priorities, analyze information, incident planning and plan execution (page 1).” Control of resources during a disaster or emergency is the responsibility of –

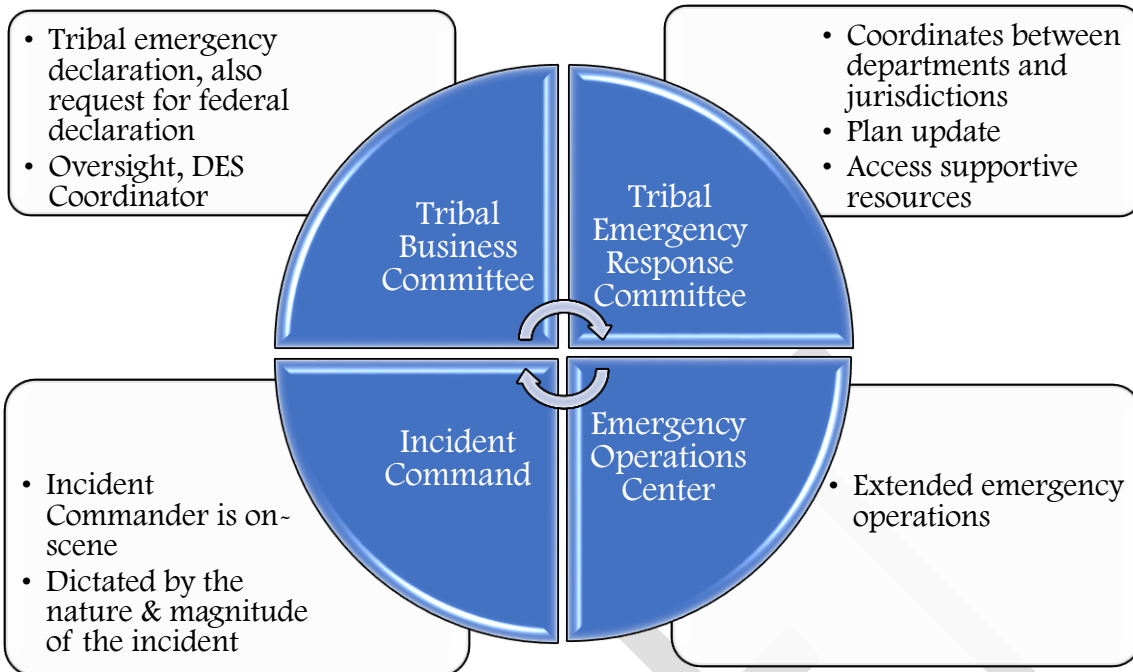
- a. Tribal Business Committee,
- b. DES Coordinator,
- c. Tribal Emergency Response Committee, including
  - Chief of Police,
  - Tribal Natural Resource Director,
  - Tribal Water Resources Director, and
  - Roads and Engineering Director.

The TERC provides coordination between departments and jurisdictions. The Incident Commander is on-scene. The command structure for responding to an emergency or disaster will be dictated by the nature and magnitude of the incident. The Chippewa Cree Emergency Action/Operations Plan describes the organization and assignment of responsibilities for the Tribal Business Committee, Incident Commanders, Emergency Operations Center, DES Coordinator, and the TERC, including the directors of involved and impacted tribal departments. The Plan also addresses administration and logistics, plan development and maintenance, communications, evacuation, mass care, severe weather, earthquake, range fire, hazardous material release, terrorism or civil unrest, radiological/nuclear attack, and mass casualty incident contingency plan (pages 3 & 4). Updating the Chippewa Cree plan can align with the Tribal Emergency Operations Plan template provided by FEMA, the FEMA State and Local Guide (SLG) 101: Guide for All-Hazard Emergency Operations Planning, and the FEMA Guide on Local and Tribal NIMS Integration.

[http://www.fema.gov/pdf/emergency/nims/nims\\_doc\\_full.pdf](http://www.fema.gov/pdf/emergency/nims/nims_doc_full.pdf)

<http://www.fema.gov/plan/gaheop.shtm>

[http://www.fema.gov/pdf/emergency/nims/eop-sop\\_local\\_online.pdf](http://www.fema.gov/pdf/emergency/nims/eop-sop_local_online.pdf)



Extended emergency operations activities include:

- Preparing detailed damage assessments, Tribal Emergency
- Operating mass care facilities,
- Procuring required resources to sustain operations,
- Documenting situation status,
- Protecting, controlling, and allocating vital resources,
- Restoring critical utility services,
- Tracking resource allocation,
- Documenting expenditures,
- Developing and implementing Incident Action Plans (IAPs) for extended operations,
- Disseminating public information, and
- Coordinating with county, State, and Federal agencies working with the Tribal government.

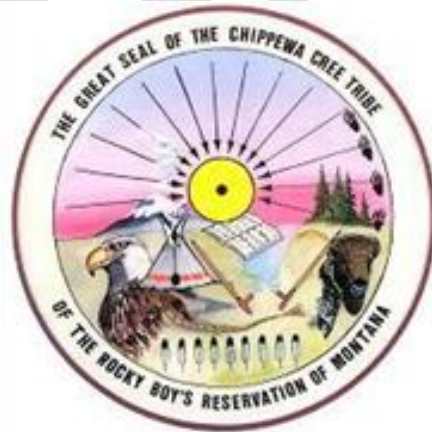
According to the CSKT Pre-Disaster Mitigation Plan 2017, page 9, “The Disaster Mitigation Act of 2000 (DMA 2000) (P.L. 106-390) provides an opportunity for States, local governments and sovereign nations to take a new and revitalized approach to mitigation planning. DMA 2000 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act (the Act) by repealing the previous Mitigation Planning section (322). This new section emphasizes the need for State and local entities to closely coordinate mitigation planning and implementation efforts. To implement the DMA 2000 planning requirements, the Federal Emergency Management Agency (FEMA) published an Interim Final Rule in the Federal Register on February 26, 2002. This rule (44 CFR Part 201) established the mitigation planning requirements for States and local communities...The March 2010 update of the Tribal Multi-Hazard Mitigation Planning Guidance and 44 CFR 201.7(d)(3) requires Indian Tribal government to revise its plan to reflect progress in tribal mitigation efforts and changes in priorities and to resubmit the plan for approval within 5 years in order to continue eligibility for FEMA assistance.”

## Tribal Declaration Pilot Guidance January 2017

The Sandy Recovery Improvement Act of 2013 (SRIA) amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended, 42 U.S.C. ss 5121 et seq. (Stafford Act) to provide federally recognized Indian tribal governments (tribal governments) the option to request a Presidential emergency or major disaster declaration. The document can be found at [https://www.fema.gov/media-library-data/1488558643845-ed263ddb090d7f739dd73bb0bfac76/TribalDeclarations\\_Pilot.pdf](https://www.fema.gov/media-library-data/1488558643845-ed263ddb090d7f739dd73bb0bfac76/TribalDeclarations_Pilot.pdf) and addresses:

- Background,
- Definitions,
- Stafford Act Presidential Declarations and Available Assistance,
- Who/What Is Eligible for Assistance in a Tribal Declaration?
- Requirements for Disaster Assistance,
- Process to Request Major Disaster Declarations,
- Criteria FEMA Uses to Make Declaration Recommendations to the President,
- Requests for Emergency Declarations,
- Declaration Decision Support,
- Presidential Declaration Determination,
- Post-Declaration Activities, and
- Appendix A: Request for Presidential Disaster Declaration Form.

FEMA is implementing this authority in three phases - (1) Use of Existing regulations (2013 – 2016); (2) **Pilot period: FEMA will use the Tribal Declarations Pilot Guidance to manage tribal declaration request, reflecting some of the unique circumstances that impact tribal communities;** and (3) Rulemaking.





## CLIMATE ADAPTATION AND COMMUNITY RESILIENCE

Resilience is defined as the capacity for households, communities, and regions to adapt to changing conditions and to maintain and regain functionality and vitality in the face of stress and disturbance... It is the capacity of a system, be it an individual or a community, to deal with change positively and to use shocks and disturbance to spur renewal and innovative thinking. The goal is to be both strong and flexible – not only to be able to bounce back but to bounce forward. Resilience strategies seek to assess and evaluate the physical and social vulnerabilities and risks in a community, identify ways to reduce or eliminate the risk and implement programs and projects to adapt and strengthen a community's physical and social characteristics... Building cultural and climate resilience can result lead to more social cohesion, resident ownership, and connections to services and programs that support residents' long-term well-being and success.

<https://www.enterprisecommunity.org/sites/default/files/media-library/solutions-and-innovation/design/Climate%26CulturalResilienceRFP.pdf>

John Paul Lederach, Professor Emeritus of International Peacebuilding states,

“Resilience suggests the character of personhood and quality of community that faces, moves through, and bounces back from difficulty, damage, or destructive experience with a spirit that pursues and stays in touch with purposeful life and meaningful relationships.”

“Community Resilience: Across-Cultural Study, Revitalizing Community Within and Across Boundaries,” a seminar sponsored by the Woodrow Wilson International Center for Scholars, also presented the following.

“A resilience model might include the following elements:

- Capacity to absorb (create openings for the inclusion of new - population, ideas, values)
- Capacity to change (create mechanisms to allow institutional change to occur more easily)
- Capacity to accommodate the unexpected (planning and policy frameworks that allow room for the unexpected, and that enable regular review in light of these unexpected factors).”

The *Comprehensive Economic Development Strategy for the Chippewa Cree Tribe of the Rocky Boy's Reservation*, (CEDS 2014 - 2019) was developed to fulfill grant requirements of the US Department of Commerce Economic Development Administration. For the first time, the CEDS required a section on disaster and economic recovery and resiliency strategy. The following pages are excerpts.

A preliminary survey was conducted on the businesses located on the Rocky Boy's Reservation. Findings indicate one business, PlainGreen LLC, has an economic resiliency plan. The need for all reservation businesses to have economic resiliency plans and a process to establish those plans are based on a presentation by the National Association of Development Organizations Research Foundation (Gail Moraton, CBCP, Business Resiliency Manager). The Chippewa Cree Tribe will proceed accordingly to address economic resiliency within reservation businesses as a disaster preparation action for business continuity, to save property and resources, reduce the time making critical

decisions, recover business function quicker, and shorten the recovery window. The following will need to be carried out: 1) hazard and vulnerability assessments, 2) gather information, 3) know the operations including the supply chain, 4) develop workaround methods for critical business functions, 5) have a communication plan for employees, customers, suppliers, and key contacts, 6) know the information technology and vital records, 7) know finances, and 8) know when to test and update the plans. Training and team meetings will initiate and follow through the process.

<b>Recovery and Mitigation – Chippewa Cree Challenges</b>
<p>Small rural population</p> <p>Location of safety infrastructure such as EMTs and structural fire truck, and law enforcement</p> <p>Limited options for transmitting information</p> <p>Potential for widespread disruption in the delivery of goods and services</p> <p>High number of at-risk individuals: low income, stationary, elderly</p> <p>Limited transit options</p> <p>Heavy reliance on imported materials and food</p>

#### **Opportunities to Consider During Post-Disaster**

- Disaster-resilient land use patterns,
- Hazard mitigation construction techniques,
- Energy efficient buildings,
- Healthy community design,
- Affordable or workforce housing,
- Alternative transportation networks,
- Environmental preservation and habitat restoration, and
- Sustainable industry recruitment.

#### **Economic Redevelopment**

The ability of a local economy to rebound after a disaster dictates the success of the community's long-term recovery. The return of jobs, capital investments, and other indicators of economic health are dependent upon housing recovery, infrastructure restoration, environmental restoration, and social service provision. The involvement of the private sector in the post-disaster planning process is imperative for determining the priorities and actions that will be beneficial to restoring the local economy. Consideration must be given to the different obstacles that could potentially hinder economic recovery, such as those that small businesses will face, decisions employers will have to make about whether to relocate, opportunities for sustainable diversification of the economic base, and job training and workforce recruitment needed to meet altered market conditions after a major disaster.

#### **Infrastructure and Public Facilities**

Taking advantage of opportunities to upgrade, mitigate, or even relocate infrastructure or public facilities after a disaster is critical. Advanced planning allows a community to make deliberate decisions about redevelopment that it may otherwise have had less opportunity to do during the post-disaster rush to rebuild. Decisions about infrastructure

reconstruction will influence private redevelopment decisions, and using disaster repairs as an opportunity to include hazard mitigation allows the tribal government to lead by example.

There are various tribal departments and stakeholders involved in providing infrastructure, public facilities, and utility services. Before and after a disaster, these private and public entities need to establish communication and coordination procedures to ensure that long-term recovery and redevelopment occurs in an efficient and organized manner. Each department and organization should have its own recovery plan; however, if any opportunities for directing redevelopment are to be pursued then coordination and communication are critical.

### **Financing Infrastructure and Public Facilities Repair**

When a community starts to make decisions about which structures to relocate after a disaster or which mitigation projects it should invest in pre-disaster, they should consider funding availability. Knowing where to prioritize spending requires some basic knowledge of what is being covered under insurance policies, which projects will be eligible for federal reimbursement through the Public Assistance Program, which projects can be funded through grant programs, and what financial reserves can be targeted for grant matching funds or local investment. When a community begins to address its infrastructure issues as part of the initial planning process or as a pre-disaster implementation action, it can launch an assessment of the Chippewa Cree Tribe and tribal organization's insurance policies to determine which facilities are covered and for what extent of damage. They can then use this assessment to make decisions about increasing coverage or financing repairs to uninsured structures. They can also determine whether mitigation enhancements would be covered under current policies and Public Assistance or whether additional funding would be needed.



## CLIMATE AND SUSTAINABILITY

The **2030 Agenda for Sustainable Development** contained a document entitled Transforming Our World: The 2030 Agenda for Sustainable Development that was adopted by the United Nations General Assembly on 25 September 2015. The new agenda seeks to leave no one behind and aspires to transform the world in which we live.

According to <https://sustainabledevelopment.un.org/post2015/transformingourworld>,

*This agenda is a plan of action for people, planet, and prosperity. It also seeks to strengthen universal peace in larger freedom... The Goals and targets will stimulate action over the next 15 years in areas of critical importance for humanity and the planet.*



### People

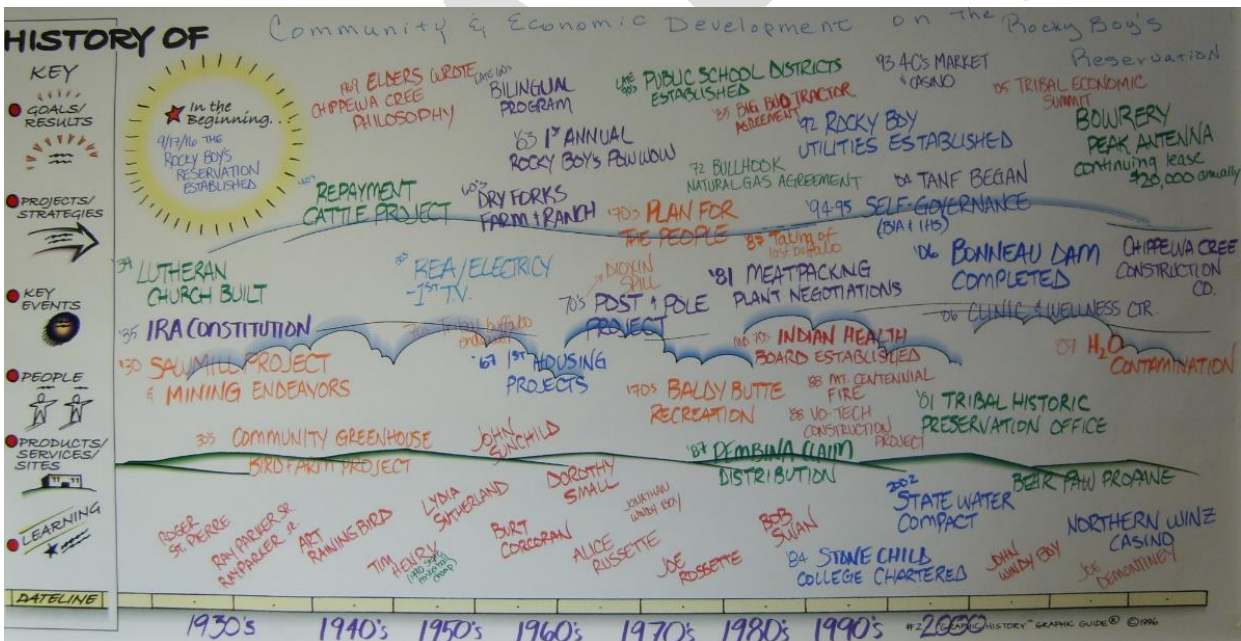
We are determined to end poverty and hunger, in all their forms and dimensions, and to ensure that all human beings can fulfill their potential in dignity and equality and in a healthy environment.





## Planet

We are determined to protect the planet from degradation, including through sustainable consumption and production, sustainably managing its natural resources and taking urgent action on climate change, so that it can support the needs of the present and future generations.



## Prosperity

We are determined to ensure that all human beings can enjoy prosperous and fulfilling lives and that economic social and technological progress occurs in harmony with nature.



*Ground Zero, 2016*

## Peace

We are determined to foster peaceful, just and inclusive societies which are free from fear and violence. There can be no sustainable development without peace and no peace without sustainable development.



*UN Flags*

## Partnership

We are determined to mobilize the means required to implement this Agenda through a revitalized Global Partnership for Sustainable Development, based on a spirit of strengthened global solidarity, focused in particular on the needs of the poorest and most vulnerable and with the participation of all countries, all stakeholders and all people.



**The Chippewa Cree Tribe of the Rocky Boy's Reservation** is located in a rural setting, with a growing population, which is unusual for other rural Montana places. The young people are leaving rural Montana in search of employment, training, and education, or “rural flight”. But at Rocky Boy's, the young people are either not leaving or are returning home.

The Reservation has been designated a strike force community by the USDA based on persistently high poverty. The correlation between population growth, resource consumption, climate change, and poverty has been determined and presented from a worldwide perspective. The Chippewa Cree Tribe will continue to monitor the population growth (on-reservation) in comparison with the total enrolled membership (on- and off-reservation).

The carrying capacity of the Rocky Boy's Reservation will be described with periodic updates.

According to the Population Division of the Department of Economic and Social Affairs within the United Nations (New York, 2015), “Integrating population issues into sustainable development, including the post-2015 development agenda,” “A Concise Report,” (on page 33, Chapter X., Ensuring environmental sustainability)”:

Consumption patterns and technology choices account for more environmental impact than sheer numbers of people. Continued global population growth, together with rising standards of living, implies much higher energy usage, but carbon dioxide emissions in high-income countries are many times higher on a per capita basis than in low-income countries. The growth in global carbon dioxide emissions has far outpaced world population growth. **In the 40 years it took for world population to double, carbon dioxide emissions increased by factor of around 2.5...** food waste will have to be reduced over the next 15 years in order to meet the nutritional needs of an additional 1.1 billion people...Climate change threatens to decrease the availability of fresh water in many arid and semi-arid regions. By 2025, UN-Water estimates that 1.8 billion people may be living in countries with absolute water scarcity.

<http://www.un.org/en/development/desa/population/commission/pdf/48/CPD48ConciseReport.pdf>





*The Guardian*, Wednesday 2 Dec 2015, published an article, “World’s richest 10% produce half of global carbon emissions, say Oxfam.” The article states, “The poorest half contribute a mere 10%...Developing countries say the West has polluted for much longer and should shoulder a bigger obligation for cutting back. They also demand assurances of finance to help them shift to less-polluting renewable energy, shore up defenses against climate impacts such as sea level rise, droughts and superstorms, and to cover damage that cannot be avoided...**Yet many rich nations, led by the United States, reject the idea** of a ‘bifurcated’ approach with obligations placed on one group of countries, and not the other.”

<https://www.theguardian.com/environment/2015/dec/02/worlds-richest-10-produce-half-of-global-carbon-emissions-says-oxfam>

The Rocky Boy’s situation is in **direct contrast** with what’s happening in the state and the nation. The Rocky Boy’s Reservation is located in a rural area of Montana. The **population** in the **rural** areas of the state is decreasing except on the Reservation where it is increasing. The United States of America is one of the **richest countries** in the world; Rocky Boy’s Reservation is in **persistent poverty**. As the United States defines its role for population control, carbon emissions, and climate adaptation, the Chippewa Cree Tribe must take action on behalf of the Tribe’s needs and interest within the context of the native culture and as a sovereign nation.



## APPRECIATIVE INQUIRY

### *Discovery*



“...the disproportionate social, cultural, spiritual, environmental, and climate impacts on indigenous peoples, who are the first and worst affected by the disruption of intact habitats, and the least responsible for such impacts.”

“...you can’t talk about climate change as ‘this the natural resource aspect and that is the health aspect’ because they are all integrated and bound up together.”

FEMA’s definition of disaster, in monetary terms, is changing.

The fens are critical to the Chippewa Cree culture and practices.

“Growing up, we didn’t call it ‘living green.’ We called it, ‘living poor.’”

Plants (vegetation) may move up in elevation and the pollinators need monitoring.

Rapid warm-ups during the winter and early spring on rare occasions can lead to significant snowmelt and flooding of small streams and rivers and/or ice jam flood problems.

The first National Climate Assessment was published in 2000.

Statewide temperatures have increased by .05°F/decade since 1950.

Less snowpack and spring runoff greatly reduce streamflow in Montana’s rivers and waterways.

The rise in temperature will contribute to an increase in growing days, high risk of drought, and the conditions for largescale wildfire will increase.

Winter precipitation is expected to increase in the form of rain rather than snow; snowpack will experience a large decline, making Montana more vulnerable to drought. Beetle epidemics will spread. Irrigation will face increasing strain and agricultural pests are expected to spread.



## *Dream*

Our resilience is legendary.

It may launch future leaders in the best directions for our tribe, our place, and our livelihood.

“People can make a difference and solve global problems.”

A Great Chief once said, in short, “If all animals were to disappear, man would die of a great loneliness.”

Prepare for stability and resilience rather than for disaster.

Some things won’t change – the strong and caring connection we have for each other as a distinct people living in this best place.

Sweetgrass growing areas may move up in elevation but will flourish with minimal effect on other native

vegetation.

Beaver management plans will consider the beneficial and potentially detrimental effects of beavers.

The carrying capacity of the Rocky Boy’s Reservation will influence population growth and density as well as food sovereignty.

Our carbon footprint will be minimized due to the use of renewable energy and decreased motor vehicle use.



## *Design*

Project W.A.R.S.H.I.E.L.D. means with aggressive resources, securing our homeland in effort to limit drugs and drug use.

“The foundation of an evolving global climate effort..”

Wetland mapping and archeological surveying are needed for cultural resource protection as climate adaptation measures.

More information is needed on how climate, water demand and water management interact.

Update emergency response plans preferably on a seasonal basis.

The Rocky Boy Volunteer Fire Department and the Tribal Emergency Response Committee are strengthened.

KHEW and the Rocky Boy DES will be critical for any emergency response.

Hosting community climate conferences held on a regular basis will establish pre-emptive action.

Climate indicator sites will be mapped.

Homes will be weatherized and retrofitted to use renewable energy.



### *Destiny*

“A Knowledge Sovereignty Plan would question how our political structure works in accordance with seasons and nature.”

Linking elders, holders of traditional ecological knowledge, with the schools will foster the history and practices that support natural resource use and management.

Our heart, our pulse, will be in time with nature, now and in the future.



## Scope of Work

The ***purpose*** of the Chippewa Cree Climate Change Adaptation Plan 2018 is to

- support a timely, effective response to weather extremes based on applied knowledge, including traditional ecological knowledge, and appropriate use of technology,
- to benefit our homeland and our people through individual, community, and tribal decisions and actions, and
- to minimize any harm to the Earth.

The Chippewa Cree Climate Change Adaptation Plan 2018 supports an ongoing dialogue between the generations to foster our culture, health, and livelihood.

### GOAL

Information gained from the best available technology, research, and partnerships will guide our decisions and actions for a healthy balance of livelihood and ecosystem.

**Objective:** The Chippewa Cree Tribe's Technology Management Plan will be a comprehensive effort spanning all entities operating within the Tribe's jurisdictional authority to support investigation, monitoring, and response.

Activity	Partnership	Priority
• Upgrade GIS, autocad, websites, and PSA's	All tribal entities,	1
• Data and information management emphasis on climate indicators	KHEW, SCC, & TERAC	1
• SCADA will address consumption and causal factors in real-time for data driven decision-making	TERAC	1

**Objective:** Indigenous research design will guide the Chippewa Cree Tribe's climate change adaptation research.

Activity	Partnership	Priority
<ul style="list-style-type: none"> <li>Design/study the carrying capacity on the Rocky Boy's Reservation</li> </ul>	TERAC, Tribal enrollment, US Census, tribal cultural community, SCC & university	1
<ul style="list-style-type: none"> <li>Establish a tribal research internship program for climate adaptation</li> </ul>	CCT & SCC	2
<ul style="list-style-type: none"> <li>Address groundwater, cultural resources, plants, and fish and wildlife in the research designs</li> </ul>	CCT, tribal cultural community, and university	1

**Objective:** The Chippewa Cree Tribe will convene a multi-disciplinary intergovernmental steering committee twice a year for on-going climate change adaptation.

Activity	Partnership	Priority
<ul style="list-style-type: none"> <li>Share information about world, national, state, regional, &amp; tribal climate policy &amp; action</li> </ul>	CCT, federal, NGO, county & State of Montana representation	2
<ul style="list-style-type: none"> <li>Fine tune Tribal DES response to climate events</li> </ul>	CCT, federal, county, & State of Montana representation	1
<ul style="list-style-type: none"> <li>Define carbon footprint &amp; sequestration</li> </ul>	CCT, federal, county, & State of Montana representation	2
<ul style="list-style-type: none"> <li>Offer climate awareness activities for the community and tribal members on a regular basis</li> </ul>	Reservation schools, SCC, TERAC, KHEW, & CCT	

## GOAL

Instill mutual consideration of different worldviews regarding climate change while holding true to our native values and culture.

**Objective:** Increase access to on-going climate change adaptation learning exercises.

Activity	Partnership	Priority
<ul style="list-style-type: none"><li>Radio programming including “seasonal sightings” and weather events. KHEW will broadcast current weather conditions every 30 minutes of air time.</li></ul>	KHEW, SCC, TERAC	1
<ul style="list-style-type: none"><li>Teach elders and Cree speakers to speak the climate language.</li></ul>	Schools, SCC, TERAC	1
<ul style="list-style-type: none"><li>Maintain an internship position for a climate coordinator on a year-round basis to be filled by an elder-in-residence, youth, or student.</li></ul>	CCT, Schools, CCCRD	
<ul style="list-style-type: none"><li>Start an “Adopt a Native Plant” project to span four years during which participants select a plant a track its location.</li></ul>	FDPNE, TWRD, CCCRD, SCC, Schools	1

**Objective:** Coordinate youth climate awareness activities.

Activity	Partnership	Priority
<ul style="list-style-type: none"><li>Facilitate “know your home” worksheets that help youth identify site specific working knowledge of the home including prevailing winds, NSEW directions, LLD, waterline, water well, wastewater mgt, plant i.d., g.i.s. mapping and address, etc.</li></ul>	TNRD, CCHA, Public Works, Tribal TANF	2
<ul style="list-style-type: none"><li>Host a youth climate conference or camp every two years and partner with other tribes or communities</li></ul>	TERAC, CCT, WIA, RBHB	2
<ul style="list-style-type: none"><li>Summer youth employees will carry out one group project per year for four years to decrease our carbon footprint as a tribe and as a community</li></ul>	Tribal Energy, CCT Procurement & motor pool, Tribal Transit	2

**Objective:** Bring youth and elders together to share knowledge about climate, technology, culture, and Rocky Boy's

Activity	Partnership	Priority
<ul style="list-style-type: none"> <li>Intergenerational food source assessment, recycling opportunities, and wastewater management needs that directly involves the community members</li> </ul>	P&D Sustainability, FDPiR, Senior Center, Public Works, RBHB, Wellness Coalition, Schools, SCC	1
<ul style="list-style-type: none"> <li>Youth and elders will jointly participate in the design of the Rocky Boy's Children Earth Science Museum</li> </ul>	Wellness Coalition, CCRPD, SCC, P&D Sustainability, Schools	2
<ul style="list-style-type: none"> <li>Tribal organizations would take turns hosting a community potluck as an opportunity to bring elders and youth together</li> </ul>	CCRPD, Wellness Coalition, P&D, Directors, Schools	1
<ul style="list-style-type: none"> <li>Youth and elders will have quarterly discussions about the Cree calendar and how it is being demonstrated in the day's observations</li> </ul>	Schools	1
<ul style="list-style-type: none"> <li>Cree language instruction will include the Philosophy of the Chippewa Cree</li> </ul>	Schools	1
<ul style="list-style-type: none"> <li>Advance intergenerational community participation in Sweetgrass restoration</li> </ul>	Wetlands, Sustainability, SCC, Wellness Coalition	1
<ul style="list-style-type: none"> <li>Conduct an assessment to help determine how climate effects mosquitos, flies, ticks, and mold in relation human health</li> </ul>	Environmental Health	2
<ul style="list-style-type: none"> <li>Foster stewardship for the Earth throughout treatment for substance abuse</li> </ul>	WSHC, sustainability	2



## GOAL

Water is life and is clean and abundant as we safeguard our resources and the Earth.

**Objective:** Identify, monitor, protect and remediate water resources that are vulnerable to climate change.

Activity	Partnership	Priority
<ul style="list-style-type: none"><li>Design and carryout assessments, protective measures, and monitoring fen wetlands that also address biodiversity, and upstream and downstream water quality</li></ul>	TERAC	1
<ul style="list-style-type: none"><li>Culverts, streamflow, wetlands, sedimentation, and gravel site locations will be identified in the Bonneau drainage, as well as cultural resource survey, wetland mapping, and archeological survey</li></ul>	TERAC, Roads	1
<ul style="list-style-type: none"><li>Monitor and report spring snow cover</li></ul>	TERAC	1
<ul style="list-style-type: none"><li>Identify other monitoring locations including the weather station, snowmelt runoff and timing, streamflow, and groundwater monitoring wells</li></ul>	TERAC	1
<ul style="list-style-type: none"><li>Maintain and review surface waterflow measurements for preflood and pre-drought conditions</li></ul>	TWRD, DES	2
<ul style="list-style-type: none"><li>Determine the costs and benefits of grading around homes to decrease damage from floods and stormwater runoff</li></ul>	TWRD, CCHA, Roads, Public Works	2
<ul style="list-style-type: none"><li>Monitor water for pesticide contamination</li></ul>	TWRD, tribal pesticide program	2
<ul style="list-style-type: none"><li>Specify the Reservation's storage capacity for water, sand, and gravel</li></ul>	TWRD, TNRD, Roads, DES	2

**Objective:** Protect water resources in Parker School due to high vulnerability to climate change.

Activity	Partnership	Priority
<ul style="list-style-type: none"> <li>Design and implement a wastewater management plan in Parker School</li> </ul>	Public Works, TERAC	1
<ul style="list-style-type: none"> <li>Utilize GIS as an information management tool for groundwater protection, flood vulnerability, beaver management, and to locate wetlands and culverts</li> </ul>	Tribal GIS Office, TERAC, Public Works, Roads	1

**Objective:** Protect wetlands on the Rocky Boy's Reservation.

Activity	Partnership	Priority
Define the role of constructed wetlands for resource management and protection	TERAC, Public Works, Roads, CCHA	1
Study the relationship between migration of Sweetgrass from the wetlands in Rocky Boy's to the headwaters and specifically consider climate adaptation, protection, and restoration	Wetlands Protection, CCRD, Sustainability	1
Protective measures at Natoose Springe will include fencing	TWRD, Roads, TNRD	1

## GOAL

As we care for the Earth, we are grateful for life's diversity and respect the gifts from all the directions.

**Objective:** Involve all Tribal Natural Resource Department programs in climate adaptation.

Activity	Partnership	Priority
<ul style="list-style-type: none"><li>• Monitor grasslands to determine migration patterns, indicator species (birds, animals, plants) and soils type</li></ul>	FW, Range, DFF, TERAC	1
<ul style="list-style-type: none"><li>• Uphold crop rotation and grazing ordinance</li></ul>	Compliance	2
<ul style="list-style-type: none"><li>• Monitor “growing days” – last frost to first frost, in different parts of the Reservation</li></ul>	TNRD, FDPIR	1
<ul style="list-style-type: none"><li>• Conduct a wood stove use analysis</li></ul>	Tribal Forestry, CCHA,	2
<ul style="list-style-type: none"><li>• Update ARMP and Pesticide Management Plan</li></ul>	Tribal Energy RB Soil Conservation District, Tribal Pesticide Program	2
<ul style="list-style-type: none"><li>• Modify standard pesticide application practices in relation to climate events</li></ul>	Tribal Pesticide Program, Tribal Environmental Protection	2
<ul style="list-style-type: none"><li>• Develop a Beaver Management Plan</li></ul>	TERAC, FW, DES	1

**Objective:** Activate the Tribal Energy Department for greater involvement in climate change adaptation.

Activity	Partnership	Priority
<ul style="list-style-type: none"><li>• Work to define our carbon footprint</li></ul>	RB Cattleman's Association, Tribal Energy, Tribal Transit, Motor Pool, and Forestry	1
<ul style="list-style-type: none"><li>• Design renewable energy projects on small and medium scales that include monitoring on-reservation solar energy use</li></ul>	Tribal Energy, CCHA	1
<ul style="list-style-type: none"><li>• Review and comment on HCE's climate adaptation Plan</li></ul>	CCT BC & Tribal Energy	2

**Objective:** Ensure that food sovereignty on the Rocky Boy's Reservation addresses climate change adaptation.

Activity	Partnership	Priority
• Conduct a biodiversity assessment	TERAC, DFF, RB Soil Conservation District	1
• Conduct a feasibility study on a native seed bank that includes Sweetgrass, research, scope(s) of work, budget, cone collection, stream restoration, cultural resources, berries, diabetes prevention, gardening, and fens.	DFF, RBSCD, CCRD, FDPIR, RBHB, Tribal Forestry, SCC	1
• Focus attention on the impact of drought on resistant and tolerant plants, grasslands, and livestock production	TERAC, TNRD, Cattleman's Association	2
• Define soil health parameters in relation to climate change	RBSCD	1
• Safeguard fisheries at critical fisheries and headwaters and maintain overstory in riparian areas.	FW, TWRD, TERAC, Tribal Environmental Protection	1
• Describe ideal food sovereignty for the Chippewa Cree Tribe of the Rocky Boy's Reservation	FDPIR, RBHB, DFF, TNRD, Sustainability, Gramma's Market	1
• List volume and type of food sold on the Reservation	Tribal EDA & CCDC	1
• Increase and improve accessibility to our own food, here and now, and in the future	CCRD, FW, FDPIR, RBHB, DFF, TNRD, Sustainability	2

